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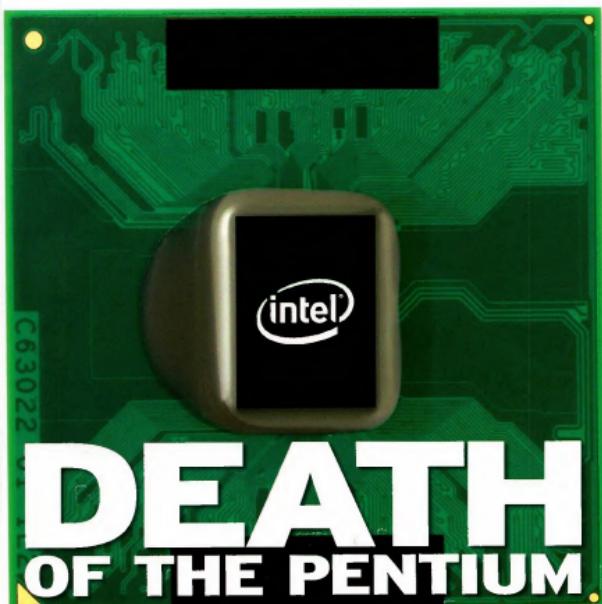


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THIS MONTH



Inside Intel's new killer chip

p46



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p30

& MUCH MORE...

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Techdesk

Latest news, trends and products in the world of technology

BATTLE OF THE BIG GUNS AT CES

SCREENS IF YOU WANNA GO BIGGER



It was all about big screens at CES. Panasonic and Samsung were quibbling over whose TV was the biggest and Dell launched this monster 30 inch PC monitor, which was reviewed last month in *PC Authority* (it's specifically not a TV screen). And LG also launched its 20 inch laptop screen. Twenty Inches. On a laptop. Can you see the potential problem here...?

MAD DRIVING

Hard disks just keep on getting bigger and the more media-centric PCs get, the more HD space you need. Atom had a stall insisting it managed to quantumly squeeze several terabytes onto a postage stamp. But it was Western Digital who really had the crowds ooh-ing and ahh-ing over its new Raptor HD. It's not particularly big, it's not particularly fast, but it's got a window! What does this mean? You can see the disk spinning, right up to moment you install it in a PC and never look at it again. Pure genius.



Google, Intel and Microsoft scrap it out in Vegas

The Consumer Electronics Show in Las Vegas is the ultimate geek shindig that just keeps on getting bigger and bigger. But this year more than ever it seemed to be about gadgets and peripherals more than the latest direction for computers and consoles.

Fundamentally though it was Google (boasting Robin Williams as its hired MC) that was the main focus of attention, a company rather more famous for producing neither computers nor consoles, nor even gadgets. Google grabbed the headlines with a slew of announcements ranging from the actually-quite-important to the utterly-mundane-yet-still-made-huge news.

Under the utterly-mundane heading came the news of Google releasing its GooglePack – a CD of software that Google likes. That's free software, as in software you can download off the Net anyway, and quite frankly, worth a lot less than the CD you received on the front of this magazine this month.

If anything, it could be seen as a sideways attack on Microsoft. By delivering key apps in one handy package, rather than having users defaulting to Microsoft, it could give Google some grip on the desktop.

VIDEO GAGA, VIDEO GOOGLE

What was more interesting was the Google Video tie-up. The company is linking up with CBS and other content providers to sell video over the Net at whatever price the vendor fancies, rather than Apple's set price through iTunes.

Even more importantly, and controversially, Google is also using its very own Digital Rights Management to secure the videos. Chief executive Larry Page was distinctively reticent about explaining exactly how his DRM worked or what it would be compatible with, in terms of hardware compatibility and DVD backups.

Meanwhile Intel was pulling the wraps off its new Viiv system, of which you'll find more about in our reviews section this month. It's a new package of video hardware standards and media packaging that intends to allow



Viiv-compliant PCs to have seamless access to a range of multimedia goodies like TV, films, music and games via the Net and corporate content provider partners.

Intel's presentation came with vague truisms like 'Content is everything' and 'Viiv will deliver a new media experience' – and the one we liked best of all, 'the PC is more PC-like' – so we'll hold our breath until we actually see one.

MICROSOFT 'STILL HERE'

Bringing up the rear was Microsoft with a fairly low-key CES presence and announcement, which did little more than unwell the next Vista beta.

The only big surprise with this was the sighting of the latest version of Internet Explorer 7, which bears a resemblance to current browser poster boy, Firefox.

What was more interesting was the now obvious breach of faith between Microsoft and Intel. WinTel no more, it seems.

'We have our own DRM that we're using. We'll be open to other things, but it seemed like the easier thing to do.'

Google CEO Larry Page takes the simple Google line on creating standards. When in doubt, just make it up.

IT'S ALL DONE WITH LASERS...

Forget about Blu-ray and HD-DVD. You can even forget about your fancy perpendicular hard disks. The real future was on show at CES, and it's holograms. InPhase Technologies had a working demo of its long-awaited holographic optical drive. The unit was so ugly we can't actually print a photo of it so



have used a hologram of kittens instead. But it appeared to work. And it blows away its mass-storage rivals.

Blu-ray's 100GB discs might sound impressive, especially compared with a 4.7GB DVD. But how does 300GB on a disc sound, transferring at 20MB a second? Probably a little like Jimmy Barnes catching his thumb in a car door. InPhase say it will be out this year but you can expect to see it in homes as part of the post-Blu-ray generation of optical



Neither featured in each other's presentations, and Intel even included Apple footage in part of its spiel to the crowds.

But Intel did insist Windows Media Centre was a key component of its Viiv concept... for the moment at least.

Elsewhere it was gadgets galore with worthy innovations like the BlueTooth-equipped car stereo, or just plain silly ones, such as the motorised inflatable pool chair, complete with stubby holder.

But despite showing off more tiny, shiny things than you could spare the spit to drool over, with no Blu-ray PS3 games, no Intel Macs, no Vista Gold version and no substantial Google news at this year's event, it's shaping up that next year's will be the must-see CES.

BEST OF THE REST

Adapters were also big at CES - this one from Digital Innovations uses a tiny cam to relay the screen of a PSP to a TV or monitor for big-screen action.



And ATO's iSee turns an iPod into an action media centre with an extra 3.6 inch screen and the capability to apparently record video and play it back on TV too, using the iPod as a storage medium.

While we have nothing against those that express themselves with case design, KickButtComputers.com are pushing it too far, especially with prices starting at \$1500. Imagine facing that with a Monday morning hangover.



This is the Parrot BlueTooth-enabled car stereo mentioned in the lead article. High-end cars already include BlueTooth-equipped audio systems, but now you can have it in a 20-year-old Holden.



Never let it be said Americans have low boredom thresholds. Apparently, filling up a car now takes too long for the poor souls, so to stop them getting bored, they need a petrol pump running Windows to download music, watch videos or play games on while gassing the tank.

CES IN BRIEF

Stereo BlueTooth

Jabra revealed its new stereo BlueTooth headphones that allow you to listen wirelessly to music and still not miss an incoming call. It can connect to two devices at once so you can hear the tunes on your iPaq, and when a call comes in, it mutes the music and allows you to take the call.

Plasma pedants

Samsung scored a short-lived record when it unveiled the 'World's Largest Plasma TV' at the show, measuring in at a whopping 102 inches. Unfortunately, a few hours later Panasonic scooped them with a larger 103 inch plasma screen. This forced Samsung to get the painters in cross out the word 'Largest' and replace it with 'First 102 inch'.

Mobile Skype

VOIP handsets were all the rage at the show. You couldn't move for tripping over yet another Unique Featured Handset. Most - like Netgear's Wi-Fi PC-less effort and Logitech's bundled webcam - were Skype-based, but Microsoft also announced that it had teamed up with Uniden for an MS Messenger handset hybrid.

Car laptops

Fast cars and laptops may not seem like a likely combination, but Acer's Ferrari laptop seems to suggest otherwise. Not be left out, ASUS used CES to launch its new Lamborghini laptop, which looks as slick as it sounds. ASUS also displayed a range of laptops using Intel's new Core CPUs (for more information, see page 46).

Back from the dead

Just when you thought Commodore was now only ever going to give you pangs for lost youth and 64 kilobytes in a pre-Internet age, the company behind the C64 and Vic 20 returns to CES. It has a new handheld media centre, but sadly it doesn't play Wizball...

'This will usher in devices providing the performance of commercial products at consumer prices.'

InPhase's Lisa Dhar is talking holograms. No, that's not an insult.

Safety Window

■ You probably felt the earth shaking when the US-based Computer Emergency Readiness Team released their latest report into PC security. If not, you should have done. The end of year study - the Cyber Security Bulletin 2005 - found Linux and Mac OS X operating systems had several times more vulnerabilities than Windows. Out of more than 5,000 reported OS weaknesses reported last year, just 821 were on Windows, while more than 2,000 turned up on Linux/OS X.

Sony coughs up

■ A legal settlement for Sony's naughty rootkit adventure could see the corporate giant giving away millions of free song downloads. A tentative agreement offers those affected in the US the choice of US\$10 in cash plus a free download of one album out of a choice of 200, or no cash and three album downloads. The court action came after Sony sold CDs with software that could leave users open to hacking or even completely disable their PCs. The real problem, of course, is that Sony failed to mention it at the time.

Firefox milestone

■ Internet Explorer rival Firefox has almost broken the magical 10 percent market share mark with new figures showing it's now up to 9.57 percent. IE still holds sway with 8.6 percent while Opera has a measly 0.55 percent (even though it doesn't suffer the massive memory blow outs that can hit Firefox). Safari for the Mac pops up on the radar with 2.86 percent.

You spuds!

■ Apple are suing a German company for using the word spud because it includes their trademarked word, pod. Liquid Air Tab's spodport allows users to download podcasts to their Nokia mobile. Can someone find some more important work for Apple lawyers to do please? Like washing cars or counting clouds?

Most Wanted**PHONING IT IN****HOT...****Pandora.com**

We've got nearly 50GB of mp3s and you know what? We're at the point of hitting delete on them all and just permanently tuning into pandora.com instead. Set up an account (for free), tell it a few of your favourite bands or tracks and it will go off and find other music you will like, much of which you may never have heard before. You can even set up different playlists to best suit your mood. It works by analysing the tracks you like and then playing you other tracks with similar qualities. If you don't like a song though, just tell pandora and it will skip to the next one. You do need broadband though. And best of all, it's legal.

Last.fm

However, if you're just looking for suggestions on new music to track down, try tuning into last.fm. It does the same as pandora.com but works a little differently. Instead of analysing each track and working out what you like about the music, it simply matches what you like with what other people with similar tastes are listening to. It also requires a special free downloadable player so it's more of a faff than Pandora's browser-based format.

Outlook

So you want to send another email to a group of people you emailed earlier. Why can't you just go into Sent Items, open the earlier email, edit the text and resend to the same recipients? Because Microsoft won't let you. You can enter tables, forms, useless bandwidth-hogging stationery, create elaborate mailing lists, send in 244pt Comic Sans and request a receipt on delivery. But can you resend an email to the same group of people without going through endless hoops and twists? No. Please MS sort it out in the next Outlook.

...NOT

'Clearly the perception out there is that we shouldn't be doing too much of that copy-protection stuff.'

Sony CEO Sir Howard Stringer resorts to Bush-style 'folksyisms' to admit sneaky isn't good.

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World War HD breaks out

The DVD is dead but battle erupts over its replacement

This year is shaping up to be the year that the battle between Blu-ray and HD-DVD ceases to be a mere war of words, and kicks into a fully fledged boxing match. With the imminent US launch of both formats, the time has come for the consumer to decide who will be the last disc standing.

Sony announced at the recent CES show in January that it will release the BDP-S1, an external Blu-ray player and recording drive, some time this winter. Unfortunately there was no mention of the launch of the PS3, Sony's next generation gaming platform which ships with an included Blu-ray drive and is expected to be a driving force in the adoption of Blu-ray.

A drive isn't much use without high definition movies to view on it, so it was no surprise to see the announcement from several studios of the impending release of Blu-ray movies. Sony Pictures Home Entertainment announced 20 titles, 20th Century Fox chipped in with another 20 while Paramount Pictures brought the total initial launch line-up to 50 with 10 of its own.

Not content to let Blu-ray steal all of the high-



def glory,

HD-DVD piped up with its own announcements regarding the launch of this competing platform. Toshiba, one of the major players behind HD-DVD, stated that the US will see the first players in March 2006 in the form of the HD-XA1 and HD-A1. At the same time Microsoft's Bill Gates announced that an external HD-DVD drive will be available for Xbox 360 later this year. Studio support for this format doesn't appear to be as widespread though, with only Paramount stepping up to offer a rather meagre 10 launch HD-DVD titles, although other studios such as Warner Bros, Universal and Time Warner have already committed to the platform. The plot thickened when Broadcom announced that it was the first company to develop a HD decoder chip that is fully compatible with both formats, paving the way for devices which support both Blu-ray and HD-DVD.

The second quarter of 2006 will be a very interesting time for the high definition war, but many industry pundits are concerned that consumers will shy away from both platforms until a clear winner is announced. And if it's not

VHS/Beta conflict is anything to go by, it won't be the most advanced format that wins. It'll be the format with the biggest marketing budget.



Bigger, Smaller, Tougher - 8GB miniHDs on the way

Consumer demand for larger (in capacity) yet smaller (in physical size) hard drives is a long way from being sated, but Cornice is the latest storage provider to offer up a tiny drive with a potent amount of space.

Its Dragon series of drives supplies an impressive eight gigabytes of storage (with an upgrade to 10 gigabytes in the near future), in a device the size of a match box. While this fact alone makes it compelling for use within portable devices such as MP3 players and phones, Cornice has also

implemented several key features to ensure it's up to a tour of duty on the rugged open road in the form of Crash Guard.

This set of three technologies should ensure that damage will not occur when the drive is dropped or shaken. If you've got a spare \$11,000 in the bank, you'll be able to pick up 10,000 of these one inch drives in the very near future, but Cornice has yet to announce the first commercial partner to use these drives. Wouldn't an external 8GB drive for your PSP be a nice addition?

'Sony will release the BDP-S1, an external Blu-ray player and recording drive, some time this winter.'

With Microsoft's external HD-DVD drive on the horizon, the arms race will kick into overdrive this year.

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- Athlon 64 X2 4400+ from \$750
- Viewsonic VX924 from \$600
- iPod Nano 4GB from \$350



Renegade

Just when you thought two video cards was an obscene amount of graphics processing power in the PC, along come Dell and NVIDIA to make standard SLI look positively sluggish. The two companies have teamed up to create the imposing XPS 600 desktop gaming machine, powered by a staggering four NVIDIA 7800GTX GPUs.

This has been possible thanks to the introduction of a new NVIDIA video card which incorporates two separate 7800GTX GPUs onto a single card, alongside an astonishing 1GB of memory. The new Dell machine will include two of these massive cards, giving it a grand total of four 7800GTX GPUs and 2GB of memory dedicated solely to the graphics subsystem.

We have to wonder just how Dell plans on feeding these cards enough data that the CPU isn't a bottleneck, with the 'factory overclocked' 4.26GHz Intel Pentium Extreme Edition chip not looking up to the task.

Broadband snails

■ Australia is lagging behind the developed world in its broadband speeds, new research has found. Just a few years ago Australia was ahead of countries like the UK in terms of cable and ADSL rollout. But the nation's broadband speeds have since stalled - despite growing numbers of users - while the rest of the world has now moved on. Other countries now only define speeds like 4Mbps as broadband, while ISPs here still cap 256Kbps as broadband. The problems here arose when Telstra deliberately capped ADSL speeds to guarantee a quality of service to customers, then dragged its heels on upgrading to ADSL2 and expanding its cable network. The limited speeds haven't hindered demand though. The ACCC found broadband take-up had doubled over the past 12 months.

Throwaway music

■ A new study has found easy (and often illegal) downloads has diminished the iPod Generation's respect for music. The research group found music no longer commanded the enduring mystique and excitement it once did and had become a far more disposable consumer commodity than in previous generations.

Games can kill

■ Don't you wish they could make up their minds? Another month, another study into the effect of video games... and this one finds it can increase aggression in players. A US team measured brain response in players and found they were desensitised to violent images which led to the wild leap in logic that they were more likely to commit violent crime.

Chatroom bullies

■ A US man is suing two others and AOL for abusing him in a chatroom. Sensitive soul George Gillespie claims he was humiliated by the men.

Get in touch

■ Send details of news, new products or technologies to techdesk@pcauthority.com.au



Brave Pro World

Philip Argy looks to the future and worries about IT professionalism - and robots that can kill.

In the movie, I, Robot, Will Smith plays the role of a technophobic cop investigating whether robots had a hand in the death of a leading scientist. A central premise of the film is that robots are bound by three primary rules designed to protect human life and interests.

While robots of the sophistication shown in this movie remain the province of science fiction, the world is clearly moving closer to a time when robots will play a much greater role in everyday life.

But the same is also true of the ICT professionals who create and program these robots. I believe it will be ICT professionals who are members of professional organisations around the world who will take the lead in developing the prime directives that make robots safe for humans.

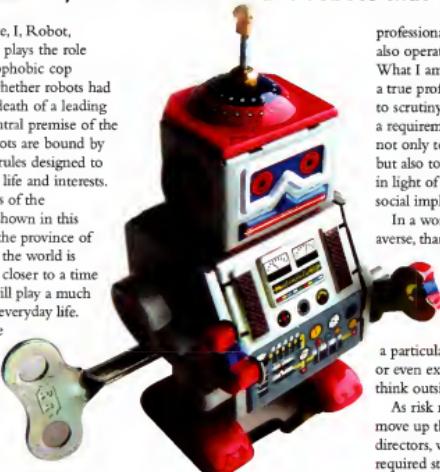
Thus ICT professionals have a critical role in driving the ethical considerations for future robots. As the new President of the Australian Computer Society, I believe in the value of professionalism. But what does professionalism mean and why is it so important? It means that:

- Their academic and technical qualifications have been objectively assessed and verified.

- Individuals are required to continually update their knowledge.

- They have access to other experts in their specialist field and can both share and acquire knowledge and access to skills.

- Ethical, social and legal implications of technology are actively considered when



designing and applying technology systems and processes.

- Members recognise the value of contributing to their profession and developing young professionals through mentoring.

- And they are subject to strict disciplinary measures if they perform either unethically or unprofessionally.

These criteria immediately convey to the world that you are committed to the highest standards and maintain a level of knowledge, expertise and mental acuity that ensures you are more able to deliver requirements on time, on budget, and with less risk.

While any competent robot programmer can design and install key functions, it will be a true professional who not only programs the basic commands, but also brings to bear the social implications and sensitivities.

I'm not suggesting that programmers who don't have

professional affiliations cannot also operate at a professional level. What I am saying is that being a true professional that is subject to scrutiny by his peers creates a requirement for each individual not only to maintain their skills, but also to consider every project in light of its ethical, legal and social implications.

In a world that is highly risk averse, thanks to events like 9/11 and corporate collapses of companies like Enron, it is no longer enough to acknowledge that a particular approach is preferred or even expected. We have to think outside the box.

As risk management strategies move up the priority list for board directors, who stand liable if the required standards are not met, we are seeing greater recognition that it is essential to employ people with the proper credentials and a professional approach.

In specific areas such as ICT security, where poor or unethical conduct can pose serious risks to life, information and property, there needs to be some form of accreditation of credentials to protect business and the community. After all, these days even builders and electricians need to be licensed, let alone doctors, lawyers and dentists.

In the world of the future, when robots play an integral role in daily life, the qualifications and ethics of those who design and build them will have to be beyond reproach or we could face a situation where I, Robot moves from science fiction to reality.

Philip Argy is President of the Australian Computer Society for 2006-2007. See www.acs.org.au.



'A true professional not only programs the basics, but also brings to bear the social sensitivities.'

We're guessing this is proof positive then that Shane Warne is not a robot, despite the rumours.



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PushP2P

■ What with all those long winter nights and stuff, the Swedes have a lot of time on their hands. Which is probably why they can come up with stuff like this - a new form of peer to peer sharing based on PDAs, Wi-Fi and bluetooth. It works by PDAs checking in with each other whenever they're near another one, looking at the owner's taste in music and automatically swapping tunes over the ether... no Internet required. Thus random strangers can help build up each other's music collections just by taking the same train or bus in the morning with no user intervention required. It's called Push! and details can be found at <http://tinyurl.com/ca57h>. The RIAA is gonna have a hard time cracking down on this one...

The unPC PC

■ US chain Wal-Mart had to take a hacksaw to its online store after it started making racist suggestions to DVD buyers. If you bought the Planet of the Apes DVD, the website would suggest you might also like DVDs on Martin Luther King and a series of other black African-Americans. Wal-Mart fixed the Apes link, but soon found the website was also making similar unsavoury links when you tried to buy Charlie and the Chocolate Factory.

Rokr dead

■ Just a few months after Apple and Motorola joined forces for an all-singing, all-dancing (literally) launch of the new iTunes Rokr phone comes news that the Rokr is dead already. Panned for being ugly as sin and limited to just 100 songs, the Rokr has been replaced by the Rokr 2.0... without iTunes or Apple.

PC Authority hits a ton

100 issues old and eight years young.

Tim Dean wonders if we'll get a letter from the Queen.

One hundred issues, and more than eight years down the track, I have a lot of fond memories of working on this fine publication. I still remember my shock, surprise and incredulous joy on the day I was hired by launch editor Val Quinn in 1997. That someone would actually pay me to play around with the latest and greatest computing products was a startling concept, but one that I relished.

I learned a number of tremendously valuable lessons in those early years at *PCA*. Probably the most significant of which was that technology in and of itself is actually not what's important. It's what it does that matters. It's easy to get wrapped up in silicon for silicon's sake, but ultimately technology is meaningless unless it actually does something that improves the way we live or work.

I also learned a few lessons about the joy of deadlines. In fact, I have some distinctly hazy memories of a particularly gruelling session some time in 1998. After wrestling with an unruly mob of brand new 56K modems (and this was in the time of X2 and K56Flex, not even V.90), and pulling an all-nighter to get the Labs written in time, I then proceeded to drive home, pick up my overnight bag, and head straight to the airport for a 7am flight to Melbourne. A brief mid-air snooze later, I was on my way to the Convention Centre to man the *PC Authority* stand at the PCIT show for the day. I even managed to make it to dinner that

night with the rest of the *PCA* crew before crashing out and dreaming of asynchronous digital modulation and meandering chats to readers at the show.

There were also many memorable moments when particularly significant products arrived at the Labs door.

I remember the entire office getting to its feet to greet the

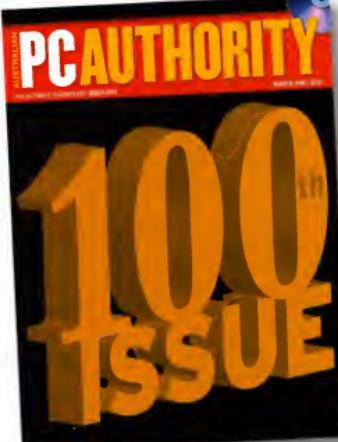
of the moment. Looking back, it's interesting to note how this pre-empted the wane of megahertz as the primary yardstick of PC performance.

I also have some very fond memories of my time editing *PC Authority*, especially when it came to some of the more controversial moments. I was

working on our intended cover for the August issue, 'Ditch Microsoft', looking at alternative operating systems, browsers and office suites. One could assume that because Microsoft had been a past and potentially future advertiser, that it may seem like a conflict of interest. It turned out to be anything but, and needless to say, the cover went ahead and the issue was a big success. We can proudly say that *PC Authority* has always understood the independence of editorial, and has never let any other factors influence it.

And today my greatest joy in working with *PC Authority* is from being somewhat on the outside. I am now able to look forward to picking it up each month and reading it from cover to cover, like a regular reader.

I still think it's the best technology magazine on the newsstand, and I'm proud to have been a part of it over these last eight years. So, I guess I'll catch with you again for the 200th issue.

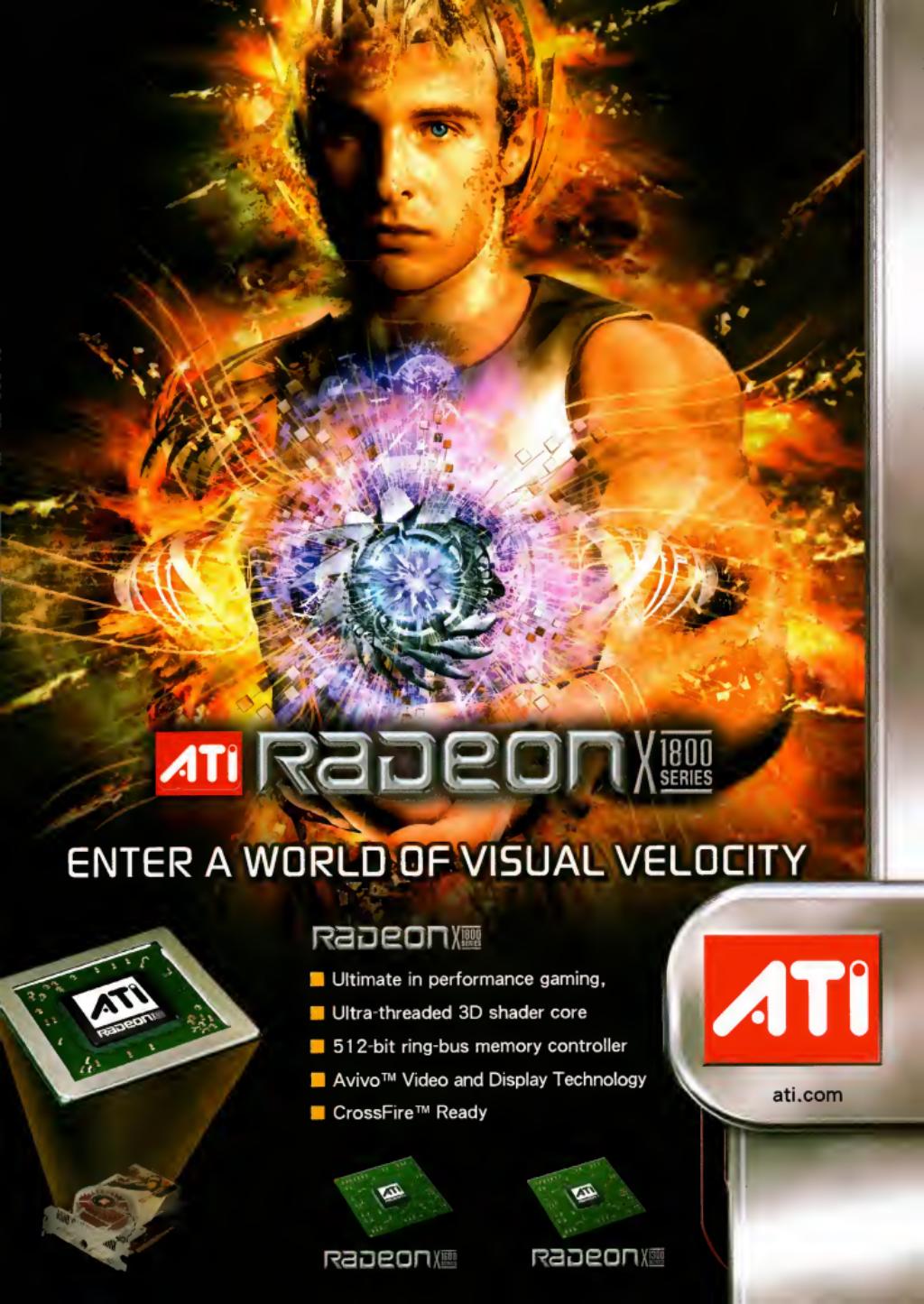


first 1GHz processor when it arrived in 2000. We all stood there, huddling around the open case of a Gateway PC (before Gateway fled our shores rather than keep competing with Dell), peering in at the black cartridge containing the milestone CPU.

The thing was, no-one really knew what to do next. It was, after all, just another PC. Plugging it in and seeing a small incremental increase in benchmark scores seemed to miss the significance

'Technology is meaningless unless it actually does something that improves the way we live or work.'

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Bright ideas

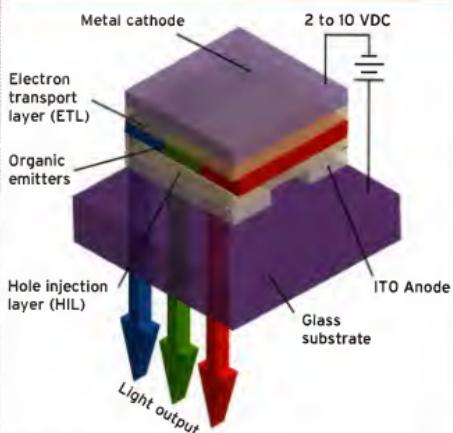
LCDs are only just starting to take off yet their days could already be numbered. **Tim Dean** takes a look at the coming OLED revolution.

When it comes to painting a picture of how the future might look, such as in science-fiction, it's not uncommon to only focus on advances in a few areas of technology and ignore other technologies completely. The areas that are ignored are usually done so because the technology in question is so ubiquitous, that we don't even consider that it might one day be replaced. Hence we see futuristic star ships rendered in the 1970s as featuring blinking lights and mechanical levers rather than sporting the slick computerised systems we possess even today.

One of the technologies that is often overlooked when we imagine the future is displays. Cathode ray tubes (CRTs) were with us for so long that they became firmly entrenched in our visions of the present and future. It's only recently that we've been shaking off the legacy of CRTs and replacing them with an image of slim flat panel screens.

In fact, I remember casting my gaze around the PC Authority offices after completing my first LCD monitor review some time in the late 1990s. I vividly remember being struck by the vista of hulking beige CRTs clustered around the office, occupying a goodly chunk of prime real estate on every desk. I then had to strain my imagination to picture an office of the future – one where these radiation spewing monsters were replaced by a legion of slick LCD screens. This was made tougher by the fact that huge 19in and 21in CRTs were all the rage at the time.

OLED Structure



Yet, I find myself today revising even this picture of modernity. LCD screens have certainly not disappointed in delivering us from the world of cathode rays, but already their end seems in sight. OLED (Organic Light Emitting Diode) technology, even in its early days, strikes me as having the same significance as LCD technology did in the 1990s. As such, it may not be long before we reminisce about an office filled with LCD screens with a hint of nostalgia, as we sit before our wafer-thin OLED displays and electronic paper.

The dyes have it

Necessity may be the mother of invention, but serendipity is surely its father.

Like so many momentous discoveries, OLED technology was stumbled across in a laboratory when Eastman Kodak scientist, Dr Ching Tang, found that certain carbon compounds glow when stimulated by an electric current.

The organic compound itself is similar to the molecules responsible for phosphorescence in the animal kingdom. When a voltage is applied to the organic compound, an electrical reaction takes place which results in the emission of a photon. Unfortunately, this reaction is not always reliable, and the most basic implementations only result in a very dim glow. It takes a considerable amount of chemical wrangling to improve the efficiency of the reaction and ensure a bright and steady stream of photons. The compounds can also be 'doped' with fluorescent dyes to improve the efficiency and control the colour of the light being emitted.

In an OLED display, the emissive layer, which



A series of OLEDs in their base primary colours mounted vertically in glass.

is the layer containing the organic compound, is sandwiched between a metallic cathode on the back and a transparent anode on top. The electrical current flows from the cathode at the back to the anode on the front, also passing through a couple of other layers that assist in encouraging the correct electrical reaction to generate photons from the emissive layer.

Compared to an LCD screen, an OLED display has far less layers, and because OLEDs are emissive, they do not require a backlight. This makes for a significantly thinner screen with even lower power consumption than LCD. Also, because the light doesn't have to travel through an aperture, as is the case with an LCD screen, OLEDs have a very wide viewable angle.

OLEDs are also more flexible in the literal sense. They are capable of being manufactured in curved formats, or even in a truly flexible format that could be twisted or rolled up.

The big and the small

The original form of OLED, as developed by Kodak, uses small clusters of individual organic molecules in the emissive layer. As such, it's called 'small molecule' OLED. The other approach, as taken by UK firm, Cambridge Display Technologies, uses long strings of organic molecules, or polymers. This technology is often referred to as LEP (Light Emitting Polymer) or PLED (Polymer Light Emitting Diode).

Currently small molecule OLED leads the way in terms of colour and lifetime, but it has the disadvantage of requiring complex and costly vacuum deposition manufacturing. In contrast, the long polymers in LEP screens can be laid down using a variation of inkjet printing technology, which reduces manufacturing costs considerably.

Efficiency is also an issue with OLED displays. Not every electron passing through the emissive layer will enter into the necessary electrical reaction to emit a photon. This is another area where LEP

displays are ahead of small molecule OLED, with LEP having vastly more potential efficiency.

OLED displays can also be manufactured in either active or passive versions. Passive displays are the simplest and cheapest to manufacture, and should see application where smaller screens are required, such as in portable devices. A passive OLED display has small drivers lining the edges of the screen. The row and column drivers send a charge down the line, and where they intersect the pixel is lit. A passive display draws the entire screen sequentially – much like a CRT – and currently they can refresh the image 60 times per second.

Active displays are more like conventional LCD screens, and have an additional layer behind the cathode that sports an individual driver for each pixel. This enables the display to power each pixel independently and leave it on without refreshing any other pixels. Active displays typically have better brightness and a clearer picture, although they are more expensive to manufacture.

Organic process

OLEDs could very well lead to remarkably thin screens with crystal clarity and low power consumption, but the technology is not without its hurdles. Possibly the most significant is the



▲ An example of a watch with a complex OLED display.

energy levels required to produce blue light. Red OLEDs have been around for many years, but it's only been in the last decade that it's been possible to manufacture blue OLEDs, and they're still challenging to produce.

OLEDs also have the potential to come in sizes similar to LCD, but even moderately large screens need to be active rather than passive, and this increases the cost and complexity of the display.

Another hurdle to overcome is the susceptibility of the organic compounds to react to water. Even the humidity in the air can damage and degrade OLED displays. As such they have to be sealed against the atmosphere and kept well away from any water or moisture.

'The hurdles aren't inconsiderable but there are many companies beavering away on solutions.'

lifetime of the displays – OLEDs fade over time. Furthermore, the different colour OLEDs fade at different rates, with red lasting the longest and blue fading the fastest. Not only does this mean that OLED displays could have very short lifetimes, they also begin fading almost immediately, which leads to colour balance issues. For example, after a year or two, it could be entirely possible for the blue to have faded to below half its initial levels, while red is at 80 percent and green at 60 percent.

The different chemical properties of each OLED colour are also problematic. The colour of the light emitted by the OLED is dependent on the energy level of the reaction. A lower energy reaction is easier to induce, but only delivers red light. Higher

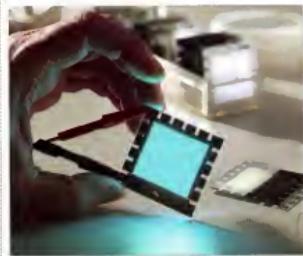
Science fiction to science reality

These hurdles are not inconsiderable, but there are many companies, lead by Kodak and Cambridge Display Technology, that see the immense potential of OLEDs, and they're beavering away on solutions as we speak. Assuming these issues are overcome, then we can expect to see a wealth of OLED displays entering the market by the end of this decade. There are already devices sporting OLED displays, such as some Kodak cameras and PDAs, but that's only the beginning.

One of the biggest potential markets for OLEDs is in computer displays and televisions. Not only are OLED screens significantly thinner than even LCD displays, but they don't even need to be built into a stand like a traditional monitor. An OLED display could be easily mounted on a wall or could drop down like a projector screen. Active OLEDs should also have a very thin bezel, enabling multiple screens to be linked together to make some truly giant examples.

The potential to create curved OLED screens should also lead to a wide range of funky gadgets, such as electronic paper or a watch that wraps around your arm and is all display.

Within a decade or so, we can expect OLED to be making a significant inroads into several markets. LCD and plasma will still be with us for many years to come, but OLED will begin eating into their applications as well as creating new ones in the coming years. It may not be long before we look back and wonder how we ever made do with these chunky, rigid LCD screens at all.



▲ A blue OLED from Philips. Blue has been a particularly tricky colour to master using OLED technology.

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The Investigator

What kind of service can you expect from one the biggest players in the business? **David Hellaby** investigates.

There is little more infuriating than being deprived of a valuable piece of equipment for a long time because of poor service.

Temper becomes frayed, harsh words are often exchanged and the situation only gets worse until someone with a level head steps in and fixes what should have been fixed much earlier. Such was the case when Mark Featherston of Western Australia had problems with his Dell Inspiron 6000 laptop.

Mark's laptop was damaged when someone left it too close to a heater. He knew the damage was not covered by warranty but still needed to get the computer repaired, so he sent the laptop from the remote mine site where he works to his head

days later he rang and inquired about the Inspiron, saying that he had been told it would be delivered within five days.

Several phone calls and three weeks on, Mark was still without his computer and had lost his patience. He claims messages he left were not returned and people he did speak to did not call back when they promised.

There followed a further three weeks of delays, excuses relating to the unavailability of parts and what Marks admits was some strong language from him to several people at Dell.

The problem, he was told, was the unavailability of a replacement screen for the Inspiron 6000.

'After two and a half months he went to the top... [and] rang Dell's head office and demanded to speak to the Australian manager.'

office in Perth, where it was to be picked up by Dell for inspection and repair. He agreed to pay an up-front quote fee of \$145.20. However, it was 10 days and several phone calls before the computer was collected, inspected and the damage repairs quoted at \$715.

Mark admits that although he had agreed to the quote, it was another 16 days before he actually paid the money by direct credit because he had been trying to recover it from the person responsible for the damage. There also had been other delays caused by him initially providing the wrong phone number.

However, that was not the end of the case. Nine

Mark says he was angry and amazed that parts were not available for what was a current model laptop. Finally after two and a half months he went to the top. Mark says he rang Dell's head office and demanded to speak to the Australian manager.

He got instant action. Within 24 hours his computer was repaired with him followed up calls to ensure everything had been sorted out. Despite the return of his computer Mark was still angry. He says he had received very poor service from a major company and had been forced to go all the way to the top before anything was done.

He received a letter of apology from Dell and a USB memory key as a gesture of thanks for 'the time spent in sending an account'.

HERE TO HELP

We welcome consumer complaints and questions, and we'll do our best to help find a solution for all parties involved. If you're the victim of poor sales, dodgy service or any other kind of dispute, we need to hear about it. If you'd like our help, email us at: Investigator@pcauthority.com.au.

Please note that the companies or individuals mentioned here are meant to illustrate the typical problems that an ordinary consumer could face. If a company is mentioned here it should not be taken as an indication that incidents described are typical of that particular company.

Please don't use the *PC Authority* or *The Investigator* names as leverage to get more than you are entitled to.

of your experience.' But rather than mollify Mark, the gesture made him madder and he wrote to *The Investigator* to relate his experiences.

We went to Dell for their comment and the company has now given Mark free damage insurance cover on his Inspiron 6000. Paul McKeon, Corporate Communications Manager for Dell Australia and New Zealand told us: 'We were very disappointed to hear about Mr Featherston's repair experience – Dell aims to deliver the best customer experience in the industry but in this case we've clearly fallen short of that goal.'

'Dell's Inspiron 6000 notebooks are among the most popular in the Australian market and we back them with a one year, Next Business Day On-Site Service and support agreement as standard.'

'Mr Featherston's says the damage to his notebook was caused by an electronic bar heater and so not covered by this warranty, but the repair he requested should have been completed in a far more timely manner – even allowing for the initial confusion regarding his contact number.'

'As a gesture of goodwill we will cover Mr Featherston's Inspiron against further accidental damage with Dell CompleteCover service for the remainder of his three year warranty.'



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Inbox

Got something to say? If you have a good story, an amusing anecdote or a tale to tell, we want to hear it!

GOOD FRIDAY ON MARS

I have just recently purchased a 16x dual layer DVD combo burner for my PC. It is so smart it will even tell you what day Good Friday is on Mars.

But why, as all floor mounted PC owners surely would like to know, do the manufacturers insist on placing the eject tray button on the underside, instead of on the top of the

made some valid comments.

I work in an industry where if a supplier say, 'Hey, if you buy my product instead of my competitors, I'll give you a bigger discount' they would go out of business. Unfortunately it's a hard fact of business. I personally don't believe that Microsoft has a monopoly. Why? When it comes to computers I have personal choice. While I choose Windows

'I personally don't believe that Microsoft has a monopoly. Why? I have personal choice.'

tray, where it would increase the usability by 100 percent?

C. Robinson

CHOOSE TO CHOOSE

Having read the letter 'Fabled Monopoly?' written by A. Fattal in the February 2006 issue of you magazine, and having read the star letter by Ziggy, I am left wondering what was A Fattal ranting about? Ziggy

as my operating system, I am fully aware I have other choices about the software I run.

I choose to use products such as ZoneAlarm Pro, AVG, Nero Premium, ULead, OpenOffice.org, Adobe Photoshop CS2 and Firefox to name a few. Why? These are the best products for me to use. Through everything we do in life we have choices, and If

I'm wrong then I would love to hear how I'm wrong.

Finally A. Fattal, adding that Ziggy should go and join the Liberal Party did more of a disservice to yourself than your intended victim. But hey, that was my choice to say that.

M. Blackman

TAKE IT SERIOUSLY

While I'm not sure I entirely agree with T Young's view in 'More Linux' (February 2006) - despite being a dedicated Linux user of five years - I wouldn't so hastily judge PC Authority's 'responsibilities' in this issue. However, I do feel PC Authority takes Linux less than half as seriously as it should.

It is true that many products, especially in the software domain, are simply incompatible with the penguin. But the greater majority of products reviewed can and will be used with Linux.

Compatibility is one of the biggest influencers when



buying for households that use both Microsoft and Tux, and usually the reason my converts eventually switch back.

I'm not asking for exhaustive testing on Linux platforms, regular Linux columns or articles preaching reforms and conversion. I ask that PC Authority realises Linux exists, even on the desktop, and that enough of us use it to warrant some mention of product compatibility. Maybe a special recommendation for the most Linux-compatible product. Or just a word rating how difficult it was to get working.

E. Terry

STAR LETTER: Anti-spam bad for business?

A customer recently changed to iNet. A week later he tried sending a newsletter to his 5000 clients but it wouldn't send. He called support who said they restrict recipients to 30, to stop SPAM. He couldn't break his contract and switch ISPs without paying penalties.

So we installed a trial version of GroupMail Free, but it couldn't import his Distribution Lists/Groups from Outlook Express. It would take hours, if not days, to recreate those. So he paid for GroupMail Personal which listed importing Groups as a feature. We installed it but the feature was greyed out.

GroupMail support explained that since recent changes to security in OE, that feature no longer worked.

We investigated online newsletter services but they seemed expensive (\$40 to \$70/month) and he still had the problem of not being able to export his Groups.

If he had XP Professional or Exchange Server he could configure his own SMTP server, but he had neither.

Finally, we found a local ISP who lets him relay email for \$20/month. It's one more thing to check before signing a contract.

S. Cullen



This month's Star Letter wins a Gigabyte G1975X motherboard, worth \$379. With the Intel 975X chipset, it is performance focused, with support for CrossFire, onboard Creative Sound Blaster Live 24-bit audio and Gigabyte TurboJet technology for overclocking environments.

For more details, phone 03 85616266 or head to www.giga-byte.com.au/MotherBoard/News/News_619.htm.

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WHAT LINUX NEEDS

So we've had this year's rant by the ubiquitous Linux zealot casting damnation and purgatory at the editorial staff of *PC Authority* for not following their jihad against the Satan of software. These people need to pull their brains back from their command lines, look at the outside world and understand the reasons for the dominance of Microsoft products.

Our organisation (a kid's charity) is a good example of why Linux will never work in its current form for business. We have 10 staff of which I am the IT Manager because I am a computer hobbyist. I think I've done a reasonable job as I've built a new server (Windows SBS 2003), installed a Smoothwall firewall, built a fleet of workstations and kept the workplace free of viruses and spyware for four years.

I've done that by following prudent policies of updating software regularly, and virus definitions daily. I also try out various Linux distributions regularly (Mandrake 10.something was the latest). It's frustrating and hasn't changed much since the days of Red Hat 6. I don't have time to learn new ways of doing things or installing drivers using six steps instead of one.

Office is so completely dominant that you don't get a job without a thorough knowledge of Word, Excel etc. Linux advocates need to realise that 99 percent of workers are very comfortable with

Microsoft and would have to be persuaded that the alternative is hugely better.

For Linux to be a viable alternative a vast number of things need to be done. For admins like myself the updating of the system needs to be vastly improved. I want one click activation of an exe file to install new drivers or applications (compile a new kernel? Get real!). The number of distributions should be culled and common standards have to be introduced.

Windows has its faults but it's a good product. Not perfect, but good and Microsoft should be recognised for the amount of work they've done to make it so.

H. Cadle

FROM THE OTHER SIDE

Having been a long-term user of Apple computers and hardware I have recently decided to build a PC to compliment my Macs. I intend to install Linux on this machine as well as Windows to have the full range of compatibility and also to play some PC-only games. As part of my research I have bought a couple of editions of your magazine which I find an interesting and informative read.

Naturally your magazine is focused on PCs and Windows, but I was pleased to see the inclusion in a borrowed back issue of a review of Mac OS X Tiger.

It is amazing to me how much of the PC industry is either following or trying to emulate Apple. For example Apple offered home users wireless connectivity in July 1999 when it introduced the Airport.

The article in your January 2006 edition about what can be expected in Windows Vista really made me chuckle. I had heard that Microsoft had borrowed heavily from OS X but the use of a metadata based search, the use of a graphics card to help render 2D graphics, translucent windows, a sidebar with mini-applications, and the new security measures are nothing new. Though I am sure that for the majority of PC users this level of innovation will be very exciting.

A. Upfold

COMPETITIONS

Ricoh, January 2006: T Lockhart, QLD; B Huynh, Vic

Netgear, January 2006: M Hambley, QLD; M Calan, SA; M Stevens, Vic

GETTING IN TOUCH

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Please limit letters to 200 words.

PC Authority extends a hearty congratulations to this month's competition winners.

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100 issues

Where were you 100 issues ago?

David Kidd looks back through the vault and ponders how far we've come.

We made it. One hundred issues is a staggering amount of words dedicated to computing technology, and after reading through every one of them, I can confidently say that we've been delivering the very best editorial out there. From issue one's Pentium II ('Awesome power you can now afford') to this month's next generation dual-core beasts, through a variety of redesigns and editors, we've always delivered the goods. Here's a quick recap of PC Authority and the tech world that surrounds us.

EIGHT YEARS OF TECH IN ONE BREATH

It's not just CPUs that have changed over the years – every aspect of computing has undergone such a radical facelift that it'd be unrecognisable in a back alley in 1997. Issue one, for example, saw us take a glimpse at the upcoming AGP standard, which is now radically becoming a legacy component in light of PCI-Express. Windows 95 had just gained some real traction and Microsoft was hoping

Windows 98 would have the same success. And it did.

Bringing multimedia to the PC was one of the biggest milestones in computing history. This brought a far wider amount of PC peripherals to the fore, like CD drives, sound cards and graphics cards. In addition, we the consumers became a picky, power-hungry lot and our demands for lower prices and cutting edge hardware saw an exponential explosion in competition. Some, like AMD, made it, while others, like the venerable 3DFX, fell away.

We've seen dial-up turn into broadband (unless you're suffering the unfortunate affliction of rural living), which has combined with the PC's historically central multimedia capabilities. This created hope in a brand new world of e-commerce and information delivery, only to fall down all by itself in the dotcom crash. Only now is the Net starting to deliver on its brand new world of web services.

And finally, we've seen behemoths rise and rise, with Microsoft's and Google's domination of the PC and web space respectively. Open source, which was once

'It's an industry as fickle as we are, and while the players come and go, there's never been a dull moment.'



the poster boy for freedom, has only recently gained mainstream acceptance with Firefox and OpenOffice, and this trajectory doesn't look like it'll change course any time soon.

It's an industry as fickle as we are, and while the players come and go, there's never been a dull moment.

THE REAL WORLD

While we obsess about frame rates, shrinking die sizes and addressable memory space, we've always cut a beeline straight towards the heart of it and given you something that's relevant and trustworthy. Whether it's reviews, opinions or features, we steer clear of technology for technology's sake – it's what it can do that we're interested in.

Looking back through the ages, our

The \$4000 PC

How far does four grand go? Here's a list of the main specs from real PCs since 1997.

1997
Pentium 200MHz,
32MB RAM, 17in CRT

1999
Pentium II 450MHz,
64MB RAM, 17in CRT

2001
Athlon 1.4GHz,
256MB DDR RAM, GeForce3,
19in CRT

2003
Pentium 4 2.66GHz,
512MB DDR RAM, Radeon
9800 Pro, 19in CRT

2005
Athlon 2.2GHz 64 X2
4400+,
1GB PC3200 RAM, 19in LCD

'Whether it's reviews, opinions or features, we steer clear of tech for tech's sake - it's about what it can do.'

reviews have always been big, deep and thorough. If you're going to part with thousands of dollars, we know you'll want something more than a couple of paragraphs. Likewise with industry stalwarts like Jon Honeyball and Leigh Dyer, we ensure insightful, useful opinions, particularly if you make your trade in computers.

But that's not to say we haven't changed. *PC Authority* has never looked more different, and regular readers will note that we've undergone four significant redesigns, with the most recent being our December 2005 issue. Somehow, we bent the laws of physics to allow bigger pictures and more words per page, without reducing font sizes.

And it's not just a lick of paint. In 2005 we built on the core foundation of *PC Authority* as a technology buying bible, and upped the ante even further. We launched our new Buyers Guide, which hosts our expanded A-List and Reviews Roundup. Finally, to really hit it home, we focused on creating a Cheapest Prices list, where we seek out the best price and tell you where to get it.

Of course, the magazine isn't an island. Our website has mimicked the stylistic changes of the magazine over the years, adding and shuffling features as we've gone along. From our online auctions, to our Tech Support forums, we've always been mindful of our online presence. And now, we've just launched our brand new online shopping service, keeping it in line with *PC Authority's* buying focus.

THE NEXT HUNDRED

Our focus has followed the trunk and branches method. The PC is our base, and while it continues to move into new areas, we'll be following it. But the worth of a PC is also determined by how it can be extended and interface with other technologies, and so the peripherals and devices that link to the PC represent even greater variance than the PC itself.

Technology is a hurricane of forces, spinning out new technologies at great pace. But you can rest assured, that throughout the changing face of PCs and technology, we'll still maintain our dedication to providing trusted advice and trusted testing.

PCs have changed, we haven't. Here's to another 100 issues.

PC Authority through time

ISSUE 1, NOVEMBER 1997:

This is where it all began, with editor Val Quinn and Labs assistant Tim Dean. Somehow, these two get a computer magazine off the ground in a crowded IT media market, and manage to create an enormously successful issue. Hats off to Val and Tim.



ISSUE 12, NOVEMBER 1998:

Another year on, and we're leading with expert advice on email, being the killer application of the day. We have moved up to two CDs, buffered up the team, and included two Labs on Pentium II notebooks and more lasers - both in *PC Authority's* hard-hitting testing format of course.



ISSUE 23, OCTOBER 1999:

The Pentium III era has arrived, and we drag it kicking and screaming through our benchmarking suite. The industry's finest DVD drives are pulled apart in a group test. We also look at the then-new DVD-RAM drives, which were subsequently panned by the Labs team.



ISSUE 36, NOVEMBER 2000:

Ah, the End of the PC. Far from it of course, but Apple's Power Mac G4 Cube was one sexy piece of kit, and we wanted to know whether it was enough to kill the PC. Sadly for Apple, it was all style and little substance, but it was certainly a preview of designs to come from Cupertino. We also feature a profile with everyone's favourite Internet pioneer, Tim Berners-Lee.



ISSUE 52, 2001:

PC Authority now sports a new design and a new editor, Tim Dean. The cleaner, sharper and professional look stood out from the pack. This issue is all about burners, but we also manage to find time to look at the very first iPod. And, yes, we liked it very much indeed.



ISSUE 72, NOVEMBER 2003:

Three years before we'll likely see the final release of Vista, we take an extensive look at Longhorn. We also peel back the layers on Media Centre, which was still a full year off its Australian release. And finally, how could we forget our first test of the Athlon 64.



ISSUE 84, SEPTEMBER 2004:

My own first issue as editor was a great way to start. Two controversial technologies, RFID and DRM, had just started getting some buzz and we go right to the heart to find out what the panic was about. Like many technologies, of course, what's best for business isn't always best for consumers - which consequently makes it a poor way to make money. That's a lesson that Sony just learned the hard way with its DRM rootkit.



ISSUE 97, DECEMBER 2005:

This issue typifies what *PC Authority* does well: reviews, investigation and style. There's a piping hot cover feature looking at everyone's best friend (or worst foe). We worked hard at a brand new redesign, as well as launching a new section, Buyers Guide, to hold our A-List and new Reviews Roundup. Our Cheapest Prices system is now in full swing, and we also implement our brand new real world benchmarking suite. A killer issue in every sense and a real



Ten technologies that didn't make it

We've seen a lot come and go over 100 issues. Here's our guide to the top techs that should have made it.

1 FAHRENHEIT

In December 1997, Silicon Graphics and Microsoft formed a 'strategic alliance to define the future of graphics.' That future was Fahrenheit: The two companies produced a joint press release promising that Fahrenheit would become the primary 3D API

solid-state devices such as Gigabyte's i-RAM, which costs \$200 for the base unit alone, to see that it won't happen any time soon. Factor in the RAM itself, and you're looking at the most expensive storage per MB known to man. Especially as trends such as pervasive computing mean there will be a near-exponential demand for storage for the foreseeable future. It's undeniably cool technology, but don't sell your shares in Western Digital just yet.

3 WAP

If there's one thing WAP (wireless application protocol) shows, it's that you should never, ever create a technology that rhymes with crap. In 1998, we were told that WAP was the future of mobile phones, bringing the benefits of the Internet to people on the move. By 2000, WAP was being submerged by criticism due to the limited range of applications, the high prices and the restrictions on what you could do by your phone carrier. No prizes for guessing the majority of the headlines.

4 THIN CLIENTS

You've got to admire Sun's dedication. It's been telling us for

► Thin clients have so far proven just a little too dumb.



'If there's one thing WAP shows, it's that you should never, ever create a tech that rhymes with crap.'

years that schools, businesses and sandal-wearing individuals would soon abandon PCs in favour of its thin clients. After all, why use a machine that's prone to viruses, liable to crash every other day and rather expensive too? The simple truth is that most people like them. We don't want to store our personal documents on a remote server and access our contacts only via the Web. And just sometimes, we like to play games and burn DVDs. For the moment at least, dumb terminals are just too dumb.

5 SMART DISPLAYS

To see the Microsoft acolytes wildly applaud Bill Gates at his 2002 Comdex Fall speech, it was easy to be sucked into the dream. Why put up with a plain old screen that just sits there on your desk? What

► Solid-state memory - the most expensive storage known to man.

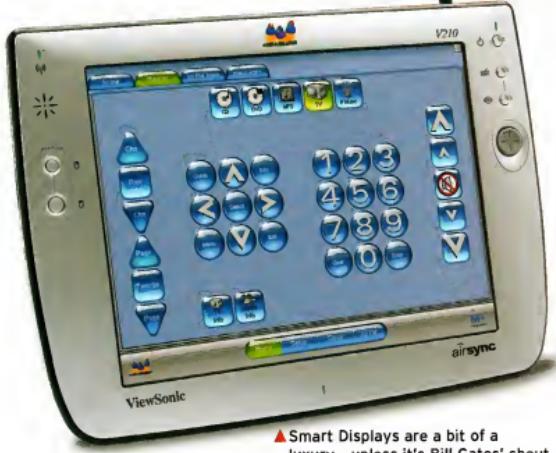
► The 'future of graphics' soon became just a stepping stone to DirectX 7.

(Application Programming Interface) and would 'evolve from Direct3D, DirectDraw and OpenGL.' Unfortunately for Silicon Graphics, it soon became clear that Microsoft was far more interested in developing DirectX 7, and Fahrenheit was quietly dumped.

2 SOLID-STATE 'HARD DISKS'

Every six months or so, we're told that solid-state memory will replace the mechanical hard disk. But you only need to look at the cost of





▲ Smart Displays are a bit of a luxury... unless it's Bill Gates' shout.

you really want is a smart display, a wireless portable monitor that could do for personal computers what wireless handsets did for the telephone. This

touchscreen panel could not only let you browse the Internet from your sofa, it also lets you access the music and video stored on your PC's hard disk. And all for just \$2500. Ah. As anyone without a global fortune

worth approximately \$60 billion will tell you, that's a little too much for not enough reward. Smart displays were consigned to history in the beginning of 2004.



▲ There are still VRML websites around, but who has the patience?

6 HYPERTHREADING

As Intel has a habit of turning everything it touches into gold, there's always some mild satisfaction when one of its great technologies turns out to be – if not rubbish – something of a damp squib. HyperThreading sounds fantastic in principle, turning a physical single-core processor into a virtual dual-core chip, but in reality we're still waiting for the benefits to arrive in convincing force.

7 VRML

We were told it would revolutionise the Internet, that HTML would be a thing of the past – after all, why browse boring, 2D sites when you could lose yourself in a virtual

3D world?

The reality quickly dawned. In 1997, when broadband was just a term used to describe the middle-aged spread of Status Quo, it took an eternity to download megabytes of data – and even now people don't have the patience. VRML sites are still around, but you need to download separate VRML browsers to use them – and most haven't been updated for years.

'The reality is you need a business plan that makes sense, not just a catchy name and a whizzy logo.'

8 THE DOTCOM REVOLUTION

It's impossible to look back on the heady days of the dotcom boom without shaking your head in wonder. Venture capitalist pumped billions of dollars into start-up companies and watched on with a benevolent eye as their cash was frittered away on pool tables, champagne and hip offices. Companies with a sound idea and business acumen, such as Amazon.com and www.au.lastminute.com, are still around and making a profit, but even this has been a struggle. The harsh reality is that if you want to make money, you need a business plan that makes sense, not just a catchy name and a whizzy logo.

9 THE PAPERLESS OFFICE

We've fallen in love with email, embraced PDFs with a passion, and GPS navigation systems have replaced the humble atlas in many a car. But the simple fact is we're



addicted to printing. Reports just aren't reports unless they're on paper with some glossy binder for that finishing touch. And if you've ever tried to read an e-magazine on the toilet, you'll know that it's just not right. Paper is here to stay.

10 VOICE RECOGNITION

Voice recognition's promise was immense, and is still immense, but it certainly hasn't become the massive industry that was promised. Its development has been incremental at best, despite the dramatic advancements made in silicon. We have no doubt this will come to the fore over the next five years, but for the moment, we'll just have to speak to each other rather than our PCs.

The history of Windows

PC Authority takes a look back at the changing face of Windows to celebrate two decades of dominance.



On 20 November 2005, Windows will be 20 years old. What started out as Interface Manager, a GUI front end for MS-DOS, has become the most successful operating system in the world, with a combined user base of over 330 million.

Inspired by the pioneering work at Xerox PARC on GUI interfaces using the Alto and Star computers – with perhaps a sideways glance at Apple's interface for the Lisa and Macintosh computers – Windows has developed from a simple, menu-based operating environment to the fully graphic, icon-driven system we know today. It has evolved from a 16-bit OS running on 5MHz 8086 PCs to a 64-bit OS running on dual-core 3.2GHz CPUs.

Along the way, it has broken memory constraints, streamlined its processes and

introduced pre-emptive multitasking and multithreading. It's moved from four-colour CGA displays to 32-bit colour screens running at ludicrously high resolutions. The Start button, the taskbar and the mouse right-click transformed the way people work, while support for USB, FireWire, Wi-Fi and advanced 3D graphics have given us new ways to use our PCs.

As a result, Windows now has the broadest church of any OS, pulling in everyone from school children to rocket scientists.

It started off facing tough competition – IBM's TopView, VisiCorp's VisiON and Digital Research's GEM were all viable alternatives – yet Windows always managed to pull ahead when it came to user numbers.

Admittedly, Microsoft's OS has never been perfect. Windows went through growing

pains as it adjusted to cope with the Internet revolution, and at times it's been clunky, patchy and unstable. Certain releases have felt like stopgaps and DOS took a lot longer to leave the scene than it should have.

Yet despite all these things, Windows has become the most widely used, widely supported and versatile OS around.

With Windows Vista's revised architecture and polished graphics hardware-based GUI, Microsoft's OS is now limbering up for the demands of a new computing age, unrecognisable from 1985.

To show you just how much things have changed, we've taken a look at Microsoft's key desktop OSes from the past two decades, outlining which particular versions of Windows you have to thank for the various tools you take for granted today.

Windows 1

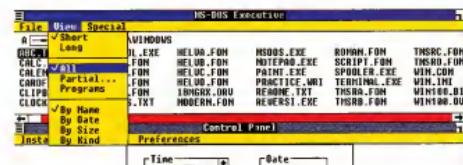
KEY TECHNOLOGIES: Windows dialogs, mouse-driven GUI, task-switching, CGA and EGA graphics.

PRICE: US\$99

As primitive as graphics operating environments could get. With few icons and no program groups, Windows 1 was little more than a shell for MS-DOS 2. Its equivalent to the modern Windows Explorer was a simple file window, MS-DOS Executive, which listed all the files on your PC. By double-clicking, you could run an MS-DOS or Windows program, or open a folder (or directory, as we called them at the time).

The GUI seemed astonishingly basic. More than one application could be opened at a time, but windows could only tile, not overlap, and most of the functionality was left to drop-down menus. The only onscreen icons – in a bar at the bottom of the screen – represented minimised programs, which could be switched to at a mouse-click. Resizable windows weren't standard either – some applications used a control in the top-right to move the top edge of the window, while a few had a control placed, as now, in the bottom right-hand corner.

With few actual Windows programs, the main draw was the built-in applets: card file, notepad, calculator, clock, monochrome paint package and terminal program. In fact, the only major Windows 1 application to receive widespread acclaim was Aldus PageMaker, an early DTP package that appeared in January 1987.



▲ It might not look much, but this was the tiny acorn from which a mighty empire grew. It's no wonder Mac users used to laugh.



Windows 2

KEY TECHNOLOGIES: Windows dialogs, mouse-driven GUI, task-switching, CGA and EGA graphics.

PRICE: US\$99

NOVEMBER 1987



Version 2 was starting to look more like a proper graphic OS. MS-DOS Executive still handled programs and file management, but in other respects the GUI had been improved dramatically. Powered by Intel's mighty 286 processor, it now supported overlapping windows and allowed them to be moved and resized anywhere on the Desktop.

Program icons could be positioned anywhere, and minimise, maximise and resize controls were becoming more consistent. Windows 2 also allowed applications to share data through Dynamic Data Exchange, while, in alliance with MS-DOS 3 and expanded memory, Windows was getting to grips with memory beyond the first 640KB.

The software base was growing too, with Word and Excel making their debut on the platform. However, Apple found Windows 2 too close to Mac OS for comfort and filed a lawsuit in 1988. Four years later, the courts ruled that a 1985 licensing agreement gave Microsoft rights to use all but nine of the 170 copyrights Apple listed.

▲ Word and Excel made their debut in the first Windows upgrade, while overlapping windows gave users more flexibility.

Windows/386

KEY TECHNOLOGIES: Extended memory support, multitasking.

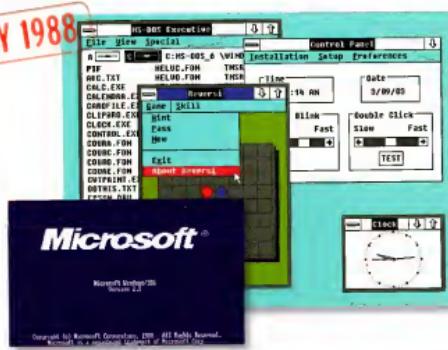
PRICE: US\$99

In May 1988, Windows 2 was upgraded to version 2.1 and rebranded as Windows/386 and Windows/286. The latter was essentially Windows 2 with the addition of a driver – himem.sys – that enabled part of Windows to run in the first 640KB of extended memory, freeing space up for Windows programs in the first 640KB and speeding up the system.

Windows/386, however, added another major feature. Using the memory-addressing capabilities of the new 80386 processor, it could run several DOS programs simultaneously in 'virtual machines', making it the first Windows to allow proper multitasking.

► This was the first version of Windows to offer any real form of multitasking.

MAY 1988



Windows 3

KEY TECHNOLOGIES: Improved GUI with File Manager and Program Manager, 256-colour VGA support, virtual memory.

PRICE: US\$150

The first truly successful version of Windows, and the world's most popular OS until Windows 95. MS-DOS Executive had finally gone in favour of the icon-based Program Manager and list-based File Manager components. What's more, support for the 256-colour, 640 x 480 VGA standard made this the first Windows to look good, with a central Control Panel that made it possible to customise the look. The interface was now streamlined and consistent, and Windows had begun to develop its own distinctive style.

Happy to run multiple DOS and Windows applications in their own windows, Windows 3 also boasted the most advanced memory management yet, with support for 16MB of RAM and 'virtual memory' – the use of hard disk space to simulate physical RAM.

By 1991, it included support for CD-ROM drives and audio hardware, plus the first Media Player and Sound Recorder applications. Windows really came of age in April 1992 with version 3.1. With scalable TrueType fonts, OLE Drag and Drop operations, and support for the high-resolution SVGA and XGA graphics standards, Microsoft's OS was now ready to take on anything.

Windows for Workgroups 3.1

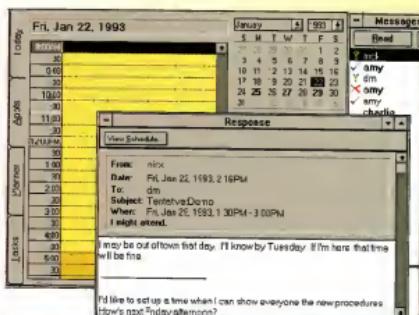
KEY TECHNOLOGIES: Peer-to-peer workgroup and domain network support. Email and schedule applications.

PRICE: US\$150

Windows for Workgroups (WfW) introduced us to the networked age, enabling simple peer-to-peer workgroups and more complex domain-based networks to be created, and working hand-in-hand with the corporate darling of the moment, Novell NetWare. The OS was available as a self-contained package or as an add-on for existing Windows 3.1 systems.

Finally, Windows users were free to share files and printers, and two new applications – a simple mail client and a networked schedule program – made the most of the new technology (as did a multiplayer card game, Hearts).

A later version, 3.11, improved stability and added a number of corporate security and network management features, plus the ability for outside users to connect to the network via a Remote Access Server. Version 3.11 became adopted as the standard version even for individual users, despite the fact that it required a 386/SX processor to run.



▲ The first network-ready Windows, with workgroup scheduling and email applications that ushered in a new era of mainstream collaborative computing.

MAY 1990

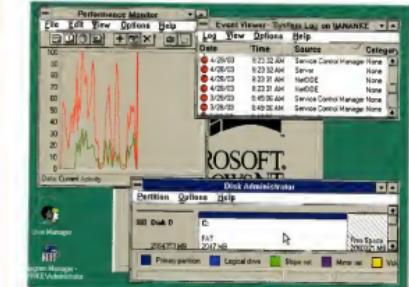


▲ Just as Windows started to develop its own style, it gave users the chance to develop their own hideous colour schemes and backgrounds.

Windows NT 3.1

KEY TECHNOLOGIES: Debut for new NT Architecture. Pre-emptive multitasking, support for multiple processors, NTFS file system.

PRICE: US\$350



▲ NT 3.1 introduced support for multiple processors.

During the late 1980s, Microsoft had been working with IBM on a plan to replace the ageing MS-DOS/Windows code base with a more efficient, modern OS based on IBM's OS/2. By 1990, the relationship was stalling, and Microsoft's development team had begun to look at ways of marrying the new OS kernel with the Windows 3.1 interface and an expanded set of Windows APIs. The result was Windows NT 3.1 – a 32-bit OS.

NT (standing for New Technology) was a more stable and secure Windows, built for effective, pre-emptive multitasking and integrated networking. It also bought a more efficient file system, NTFS and the Win32 API, which ensured some degree of compatibility for applications running under Windows NT and Windows 3.1.

While not as successful as Windows 3.1, Windows NT bought Microsoft credibility in the workstation market and provided it with a scalable platform that still provides the fundamental code basis for Windows XP today. Two further revisions, NT 3.5 and NT 3.51, made the OS more efficient and added support for OpenGL – a major step towards NT's future domination of the 3D graphics market.

MAY 1993

JUNE 1992

Windows 95

AUGUST 1995

KEY TECHNOLOGIES: New GUI, plug-and-play, Windows Desktop, system Registry.

PRICE: US\$209

Five years after Windows 3, Microsoft finally gave the Windows GUI an overhaul, introducing the Start button, the taskbar and the Desktop we all know today.

Windows 95 was designed from the ground up to be consumer-friendly, with stronger support for multimedia applications and games, animated icons and system messages, and a new 'plug-and-pray' hardware model that was intended to take the hassle out of adding and configuring new hardware.

Sadly, 'plug-and-pray' was more commonly known as 'plug-and-pray', as it was anyone's guess whether the automated routines would detect new hardware correctly or manage to configure and install the drivers without user intervention.



▲ The OS was designed to be easier to use, and brought improved support for multimedia.



▲ Windows 95 delighted with its revamped GUI. The Desktop, Start button and taskbar were here to stay.

Still, the central Desktop, where you could drop application shortcuts, files and folders, made Windows easier to use and paved the way for an OS more document-centric than the old program-centred Windows 3.1 GUI. The context-sensitive right-click menus made the mouse approximately twice as useful, and the addition of long file names saw an end to an old DOS hangover.

Whatever Microsoft claimed, Windows 95 still wasn't a true 32-bit OS – MS-DOS 7 was very much lurking in the background – but it was a step in the right direction. By dropping support for legacy runtime modes and using a central Registry to control its operations, Windows 95 ensured there was less room for applications to interfere with each other, and enabled the OS to address up to 2GB of memory (although 512MB was a realistic limit unless users adopted some risky Registry tweaks).

Windows 95 was an unqualified success and is pinpointed by some Microsoft historians as the release that effectively ended competition in the desktop OS market.

Windows NT 4

AUGUST 1996

KEY TECHNOLOGIES: Windows 95 interface, improved networking support, Internet and corporate intranet management features.

PRICE: US\$319

Known as the 'Shell Update Release', NT 4 took the Windows 95 interface and rebuilt it using Windows NT technology. The result was a desktop OS that had the slick new look and feel of Windows 95, but the more stable, memory-efficient core of NT running underneath.

Security features and network support were far advanced of anything on Windows 95, and support for multiprocessing made this the power user's OS of choice. Admittedly, the Control Panel and system dialogs showed up the joins, with a mish-mash of Windows 95 dialogs and reworked NT 3.51 panels. Hardware compatibility also remained an issue. However, this was the version of NT to make

◀ NT 3.1 introduced support for multiple processors.



▲ Despite looking very similar to Windows 95, the Control Panel saw the introduction of NT-specific icons for server and services.

companies think seriously about migrating to the superior OS platform. The Server version, with its integrated web server, effective handling of TCP/IP and network management features, hastened the corporate shift from Novell NetWare towards NT 4 and Microsoft Exchange.



Windows 98

JUNE 1998

KEY TECHNOLOGIES: Technologies integrated browser, Active Desktop, USB support, FAT32 file system.

PRICE: US\$209

The most controversial Windows release, Windows 98 got Microsoft in hot water with the US Department of Justice through its integration of Internet Explorer with the OS (seen as an attempt to squeeze Netscape out of the market).

Amazingly, most of the platform's killer features had already appeared in other forms by the time it hit store shelves.

The more efficient FAT32 file system had emerged in Windows 95 OEM Service Release 2 (OSR 2), basic USB support had rolled out in OSR 2.1, and the new browser-style interface and Active Desktop had already made their debuts with the initial release of Internet Explorer 4.

Active Desktop – which enabled users to have live ActiveX content updating constantly on the Desktop, or even use a web page as the Desktop – was perhaps ahead of its time. Most users regarded it as a stability nightmare and a resource hog, and switched it off, although the eventual acceptance of RSS, Google Desktop and Konfabulator show the idea wasn't so awful. Opinions were mixed on the web-style interface, with address bars in every Explorer window, a single-click hyperlink interface for opening files and folders, and customisable backgrounds for every folder. But Windows 98 was a more stable and speedy proposition than a mixed Windows 95/IE 4 installation. The improved USB support and power-management facilities for notebook



▲ Lurking inside Windows 98 was Internet Explorer, Active Desktop and USB support.

users, a range of system maintenance and web publishing tools made this an essential upgrade for small businesses and home enthusiasts. It was, however, really only clouding the issue for corporate users.

A 1999 update, Windows 98 Second Edition, replaced IE 4 with the streamlined IE 5 release and paved the way for Windows XP with a unified 9x/NT driver model.

Windows 2000 Professional

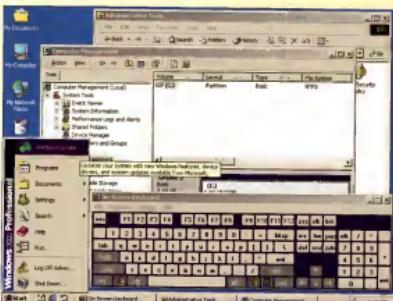
FEBRUARY 2000

KEY TECHNOLOGIES: Technologies Plug-and-Play, USB and IEEE-1394 support, ACPI power management, Desktop roaming.

PRICE: US\$319

Designed to take over from Windows NT 4 and Windows 98 on the corporate desktop, Windows 2000 was essentially a repeat of the Windows NT 4 exercise, tweaking the existing NT codebase and incorporating interface and usability features from the 9x line. Familiar Office features such as personalised menus and customisable toolbars made this a hit with power users, while proper ACPI power management with hibernation and suspend modes took NT to the corporate laptop for the first time. With support for USB, IEEE-1394, DirectX 6, Dynamic Plug-and-Play, the unified Windows Driver Model and Windows Media Player, Windows 2000 was capable of handling a greater variety of hardware and software.

Meanwhile, Desktop roaming and IntelliMirror made it possible for corporate users working with a Windows 2000 Server to use their own Desktop, complete with folders and documents, on any system attached to the network. This was the best 'serious' Windows yet, and while our own Jon Honeyball wished it had 'more zing, more pizzazz, more fun, more eye-popping capabilities,' he conceded that 'there's a whole fireworks display of things to come, and it's hard to see how [Microsoft] could have a stronger foundation on which to build'.



▲ Windows 2000 Professional was regarded as the best 'serious' Windows version to date.

Windows ME

SEPTEMBER 2000

KEY TECHNOLOGIES: System Restore, Auto Update, Scanner and Camera Wizard, fully functional

Media Player.

PRICE: \$209

The dying gasp of the 9x codebase was essentially a tidying-up operation, with some remaining DOS drags removed and a raft of features that made this Windows easier for users to maintain (System Restore and Auto Update) and more difficult to harm (automatic system file protection). Meanwhile, the new Scanner and Camera Wizard, Windows Movie Maker and revamped Windows Media Player made this an OS ready for the digital media age.

► The bundled Movie Maker video-editing tool was one of several signs that Windows was finally getting ready for the digital media age.



Windows XP OCTOBER 2001

KEY TECHNOLOGIES: Unified NT codebase, Luna interface, Start menu, ClearType, context-sensitive folders, Internet Connection Firewall.
PRICE: US\$199 (Home), US\$299 (Professional)

Finally, one core OS fits all – although Windows XP Professional included a range of high-end features (remote desktop, support for more than two CPUs, Automated System Recovery, Dynamic Disk Support and Encrypted File System) that the XP Home version excluded.

Microsoft had originally planned different shells for the two versions, but corporate testers preferred the Luna interface of XP Home to the business-like Professional GUI. The new Start panel was certainly easier to navigate than the unruly Start bar of Windows 9x, and features such as context-sensitive folders that behaved and displayed different functions according to content, brought genuine usability improvements.

With 802.11b Wi-Fi support, faster standby and hibernate modes and better offline folder synchronisation, this was also a better Windows for mobile users. It hasn't all been smooth going though. Virus writers have exploited the fact that the default Windows XP Home user has full administrative access, allowing malicious applications unchecked power. SP 2 solved many problems, and the 64-bit variant this year kept the technology ball rolling, but for many Vista won't come soon enough.



▲ Windows XP said goodbye to the messy old Start menu, and hello to a better organised Start panel that changed to reflect the apps you used and the way you worked.

Windows XP Tablet PC Edition

KEY TECHNOLOGIES: 'Ink' input system, handwriting recognition, instant switch between portrait and landscape modes.
PRICE: Not sold separately

NOVEMBER 2002

Microsoft's vision of the tablet PC required a new variant of XP to handle the demands of its pen-based 'ink' input system, voice recognition and handwriting analysis. Tablet PC Edition delivered the goods, introducing instant switching between portrait and landscape display modes, a Table Input Panel (TIP) that could toggle between an onscreen area and a text-entry zone, and a range of built-in apps that enabled you to scrawl and manipulate handwritten notes and rough drawings, or convert 'ink' to text for use in any application.

XP Tablet PC Edition 2005 included several enhancements. The TIP was coded to appear at the touch of a Smart Tag-style floating button, and handwriting recognition worked constantly in the background, making it much easier to use the 'ink' interface with standard Windows applications.

► Tablet PC Edition gave us Windows from a whole new angle – on its side.



Windows Media Center Edition

KEY TECHNOLOGIES: WMC interface, record and pause live TV.
PRICE: Not sold separately



▲ Windows Media Center is based on XP, but has a dramatically different GUI.

SEPTEMBER 2002

It's hard to pinpoint a release date for MCE, given its wide global availability, yet painfully slow Australian release date. Essentially Windows XP Professional with Microsoft's Media Center shell running on top, Windows Media Center Edition was designed to make the living room PC a reality. It brought a simple, remote-control-driven interface for playing music, showing DVDs, and watching and recording live TV.

The GUI worked well, with a clean look, an easy programme guide for selecting and recording shows, plus party tricks like pausing live TV or recording a series at a stroke. The latest version, Windows Media Center 2005, features dramatically improved picture quality over S-Video and Component Video connections, improved bitrates for high-quality video recording, and an enhanced interface that shifts away from the standard XP feel. The MCE user base is growing steadily, despite a set of hardware requirements over and above the Windows XP norm – a TV decoder card, high-end graphics hardware, remote control and infrared receiver. Working ever closer with Media Center Extenders and Microsoft's upcoming Xbox 360 games console, this could be the key consumer Window.

Windows Vista

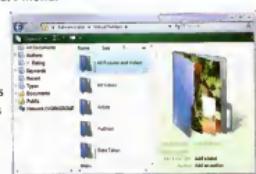
AUTUMN 2006?

KEY TECHNOLOGIES: Virtual Folders, translucent windows, XML metadata emphasis, redesigned Start menu.
PRICE: TBC

And so to Vista. Microsoft hopes to celebrate the 21st birthday of Windows by releasing what's being billed as its 'make or break' desktop OS at the end of 2006.

Our expose of the first betas (see *January 2006*, p24) examined the nuts and bolts of Microsoft's next flagship OS, and there's already a degree of excitement about the full release.

But that hasn't stopped speculation of what's to follow. For Microsoft to remain the dominant desktop OS supplier for the next 20 years, it'll have to do a lot more. Advanced voice recognition, a truly 3D interface and water-tight security are what users demand. A far cry from the primitive software PC users first bought into in November 1985.



▲ Vista promises a media-friendly interface, while virtual folders provide a new way of presenting data on your hard disk.

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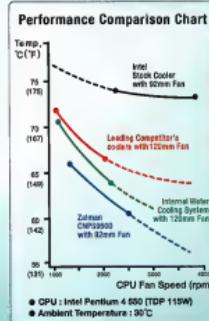


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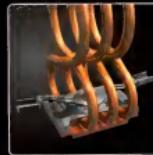


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AMD Sempron/AMD64 (Socket 754/939/940)

Specifications

Dimensions (L x W x H)	165 X 112 X 154 mm (6.5" X 4.4" X 6.1" inch)
Heatsink Material	Pure Copper Heat Pipe Copper Fin
Weight	408g (17.56oz)
Dissipation Area	3,985 cm ² (61.19 inch ²)
Fan Size	92 X 25 mm (3.62 X 0.98 inch)
Fan Operating Voltage	5-12V
Rated Current	0.35A
Max. Power Consumption	1.2W
Bearing Type	2-Ball Bearing
Fan Speed	1,350 - 2,600 rpm ±10%
Noise Level	16.0 - 27.5dB ±10%
Connector	3-Pin
Fan Speed Controller	FAN MATE 2



Xbox 360: the missing link



Stuart Andrews explains how the Xbox 360 could be the home PC's perfect companion.

A new device will be battling for the space under TV sets around the world this year. It will contain a triple-core 3.2GHz CPU, 512MB of GDDR3 RAM and a custom ATI graphics processor one generation beyond anything we've seen on the PC. It's designed to output high-definition graphics running at a steady 30 to 60fps frame rate on an HD-ready TFT or plasma screen.

This sleek, stylish unit is the Xbox 360, Microsoft's next salvo in the ongoing games console wars. After years of selling hardware at a loss, Microsoft's Xbox division is \$5.3 billion in the red and the company is launching its second console now for good reason. With Sony due to release the PlayStation 3 in Japan next spring, the stakes couldn't be higher.

The Xbox 360 is the beginning of a new era in console gaming, but it is also a product that has ramifications for the PC world. On one level, it provides competition. Why should gamers spend \$500 on a new PCI Express graphics card when they can have the most powerful games technology around for less?

But take a second look and the Xbox 360 is actually good news for PC users. Where Microsoft has previously held the Xbox and Windows at arm's length from one another, it's now creating some interaction between the two. The Xbox 360 could be the Trojan horse that actually pulls

Windows Media Center into the living room.

The basic package – the console, cables and controller – will cost you only \$500. A deluxe system, containing the console, a 20GB hard disk module, microphone headset, component video cable and wireless controller, will come in at \$650. If you have any interest in games, that's not a huge investment in itself. But even if you are only interested in extending your PC experience around the house, it's worth serious consideration.

INSIDE XBOX 360

Where the original Xbox was built around off-the-shelf components, bundling a standard 733MHz Intel Pentium III processor with an optimised NVIDIA GPU, the Xbox 360 is specialist hardware all the way. The CPU, codenamed Xenon, is a customised IBM PowerPC chip running three symmetrical cores at 3.2GHz with 1MB of Level 2 cache. To make it even faster, each core actually runs two hardware threads, much like a Hyper-Threaded Pentium 4.

The Xenon works in tandem with the Xenos, the ATI graphics processor and main memory controller. This is an entirely new architecture, understood to have little in common with the new R520 chip. For one thing, the 500MHz GPU contains 10MB of embedded DRAM, which apparently enables the Xenos to perform 4x anti-aliasing on a high-definition 1280 x 720 progressive scan image. For another, where existing PC graphics parts still split their pipelines into separate vertex and pixel shaders, Xenos uses a unified shader architecture with three parallel groups of 16 shader units that can be allocated dynamically where needed. This doesn't quite make the Xenos the equivalent of a 48-pipeline GPU, but it's close.

It's also a taste of the future – Microsoft is set to promote unified shader architectures when it launches DirectX 10, so with its multiprocessor



▲ Xbox 360 games will look every bit as good as, if not better than, the PC versions. But that will change with the advances brought by Windows Vista and DirectX 10.

architecture and cutting-edge GPU the Xbox 360 closely resembles the games PC of 2006 to 2007. The Xenos also doubles as a memory hub, with a 128-bit interface to the system's 512MB of 700MHz GDDR3 memory and a 25Gb/s path to the Xenon CPU.

The Xbox 360 runs games from a 12x dual-layer DVD-ROM drive, while plug-in hard disks and solid-state memory units will be used for saved games and local storage. With the Xbox the hard disk was built-in, but developers have been told that the Xbox 360 code must run without it. This makes the basic \$500 package a working proposition.

DIRECTX BOX

It's hard to make comparisons between the Xbox 360 and a state-of-the-art PC. Firstly, the Xbox 360 doesn't fit in with the standard DirectX technology map. In terms of 3D

features, it's slightly in advance of DirectX 9c and Shader Model 3, but behind DirectX 10 and Shader Model 4. Meanwhile, in some key technical areas, such as the Unified Memory Architecture, the Xbox 360 works very differently to anything we've seen on the PC – in the Xbox 360, it's a high efficiency memory sub-system, not just a cost-saving device.

Furthermore, the Xenon processor is a completely different beast to a Pentium Extreme Edition or an Athlon 64 X2 CPU. Modern Intel and AMD CPUs are designed to cope with a wide variety of slightly messy programming tasks. Through HyperThreading and branch prediction, they optimise code on-the-fly, taking what's called 'out of order' code and working on it in the most efficient way possible. The Xenon is different. It's great for 'in order' code – the clean, pre-optimised, floating-point heavy tasks of the type you'll find in 3D graphics – but not so great for the less-efficient code often used for game-logic, AI or physics.

This has serious consequences for programmers. First, unless game code is multithreaded, it's using only a fraction of the CPU's power. Most developers are only just getting used to multithreading. Second, all game code needs to be optimised to run in order. If it doesn't, the CPU's will struggle. Finally, there's only 1MB of Level 2 cache to play with – not a problem for a single-core processor, but a concern when there are three double-threaded cores from which to fetch and carry data.

This gives game developers some real challenges. In his August QuakeCon keynote speech, id Software's John Carmack asked whether we might have been better off in this generation having an out-of-order main processor rather than splitting it all up in these multiprocessors... the first generation of titles coming out for both platforms [Xbox 360 and PlayStation 3] will not be anywhere close to taking full advantage of this extra capability'.

From early play of pre-release titles, it appears Carmack is right. While some of the early 360



▲ The Media Blade is of special interest to PC users. While you can connect an audio player or digital camera directly, the built-in Media Extender software allows the Xbox 360 to stream media content from a Windows Media Center Edition PC.



▲ The Xbox Live service allows you to play games against fellow Xbox owners and chat to them online.

games are staggering, containing graphic effects in advance of anything we've seen on current PC hardware, others struggle to maintain stable frame rates or convey any real next-generation visual buzz.

THE ULTIMATE EXTENDER

However, the Xbox 360 gives PC users an additional reason to get excited. Where Microsoft made it abundantly clear that the Xbox was a games console, it has made more of

the Rollup 2 edition of Windows XP Media Center Edition (MCE), the Xbox 360 acts as a fully featured Media Center Extender device.

Previous Media Center Extender devices have left us waiting for content, or have provided a watered-down version of MCE. Not the Xbox 360. Streaming files across your home's wireless or wired network, the console replicates the full experience, with no noticeable effects on performance.

There are two caveats. You can't record TV

'The Xbox 360 isn't big enough or powerful enough to be a true "home hub".'

the Xbox 360 as a multimedia centre.

With its new-look 'Guide', the Xbox 360 has the most sophisticated interface of any console yet. The Guide is divided into a series of screens, called Blades, that provide access to games, your profile and communications on the Xbox Live online gaming service, plus your system settings.

The Media Blade is very interesting for PC users, and a sure sign of how close the Xbox 360 and Windows are becoming. Like the original Xbox, you can rip CDs to your Xbox 360 hard disk, then play them while watching Microsoft's stunning interactive visualisations or use them as a soundtrack in your games.

But the 360's media capabilities go way beyond that. Plug an iPod or MP3 player into one of the unit's two USB 2 ports, and the Media Blade will stream songs from it. Connect a digital camera, and your Xbox 360 will showcase your pictures on your living-room TV screen. However, things get really exciting when you network your 360, via the built-in Ethernet port or the optional Wireless bridge, to your home's main Windows PC.

Even if you just use Windows XP, you'll be able to play music and view photos held in the My Music and My Photos folders using XP's Media Connect features. However, if you use

from the console (only from your PC), and you can't stream DVD playback for legal reasons. Otherwise, you can use the Xbox 360 to watch live TV or any high-definition video on your system and play back music as you would from your PC. Early adopters will even find a Media Center-compatible remote in the box, with a larger, more feature-rich version available as an optional extra.

This approach makes sense. While many users employ a purpose-built MCE system in the living room, a growing number now stick it elsewhere. The study is a more traditional place for the PC and, given the amount of cabling and the presence of broadband access points and PC peripherals there, a sensible one. This keeps a noisy high-performance system out of sight and out of earshot, while extending all that entertainment to the living room via the less obtrusive console.

Admittedly, there are some areas in which the Xbox 360 might be seen as competing with the PC. DVD, photo and music playback capabilities are one thing, but the Xbox 360 also features a range of communications facilities, including messaging, voice and video chat, albeit only over Xbox Live. Still, Microsoft makes it clear that, whatever the overlap, there's no competition. As

Forrester analyst Paul Jackson notes: 'The Xbox 360 isn't big enough or powerful enough to be a true "home hub". Microsoft maintains that a PC is still the best and easiest-to-use device to sit at the centre of the future digital home.' Instead, Microsoft regards the Xbox 360 as an 'amplifier' for digital media.

Microsoft admits that it views the Media Centre PC as the hub, pointing to the power Windows XP gives users, and the management and creation tools it offers. But it stresses the Xbox 360 and the PC will work hand in hand.

As for the future, Microsoft refuses to comment on Vista's media functionality, but it's already widely rumoured that Media Center will be built into the 'Home Premium' and 'Ultimate' editions of the new OS. Combine the power of Vista in the study with the Xbox 360 as the 'amplifier', and you have a PC media combo to be reckoned with. The Xbox 360 could be a cost-effective device that complements the PC on the home network while providing its own killer app.

THE GAME'S UP?

Of course, there's one clear area where the Xbox 360 can't help but compete with the PC – games. The PC's share of the games market is declining and the Xbox 360 and the PlayStation 3 could make things worse. The new consoles are capable of producing incredible graphics that can handle the sort of titles – first person shooters, tactical-action games, fantasy role-playing games – that have traditionally been the PC's province. Many of the biggest PC titles of the next six months, including id Software's Quake 4, Activision's Call of Duty 2 and Bethesda's Elder Scrolls: Oblivion, are also due on the Xbox 360 and should look as good on the console as they do on any PC.

To make matters worse, some of the PC's staunchest advocates have taken the Xbox 360 to their bosom. Carmack has already announced that he has shifted his development efforts over to the console and that the company's next-generation Wolfenstein game will appear on the Xbox 360 first.

But PC games are far from dead. Nick Parker of analyst Screen Digest calls the drop in the PC games market 'a gentle decline, but not a sea change... Nobody I've spoken to in the PC market is worried that people will move away, and companies such as Electronic Arts are still doing great business on the PC.'

Despite the success of Xbox Live, the PC remains the biggest platform for online gaming. There are only 2.2 million Xbox Live subscribers worldwide, while over four million people play World of Warcraft, alone.

Secondly, as Parker explains, 'PCs appeal to a die-hard type of gamer'. Whether they're after deep strategy titles, large-scale massively multiplayer games or cutting-edge first-person shooters, the PC will continue to deliver a better experience'.

And Microsoft remains committed to the platform. Its new Games for Windows initiative represents 'its biggest ever investment

Clash of the Titans

In August's Intel Developer Forum, Intel announced a new platform - Viiv - designed to do for the digital home what Centrino did for mobile computing. Viiv takes dual-core Yonah CPUs with advanced graphics and high-definition sound hardware, then combines them with Windows Media Center Edition and a set of consumer-friendly features. Users will get a standard remote control, rapid switching on and off (using Intel Quick Resume technology), and software to simplify setting up a home network and sharing media files between the devices on it. With an optional TV tuner, Viiv can also play and record live TV.

But the really interesting thing about Viiv is the proposed form factor. At IDF, Intel was showing off Viiv in a small, living-room friendly unit that, according to Don McDonald of Intel's Digital Home Group, packs 'a fully featured, fully equipped power box into a very sleek form factor'. Intel executives talk about OEMs producing Viiv in consumer electronics designs, similar to a stereo component or DVD player.

So, will Viiv be duking it out with the Xbox 360 for a space under your living-room TV set? Maybe. While details on the graphics capabilities of Viiv are sparse, the fact that McDonald showcased NCsoft's City of Villains during his Viiv presentation made it clear that Intel sees Viiv as a viable gaming platform. However, it's more likely that the two will work in partnership. While Intel hopes Viiv will take off in the living room, it also sees it arriving in more traditional desktop or tower designs. In that case, it lends itself to the 'PC in the study, Xbox 360 in the living room' set-ups.

Also, a core part of the Viiv platform is that it's designed

to push stored content out to compatible devices around the home. It's believed that Intel will certify the Xbox 360 as a Viiv-compatible extender. Moreover, while gaming has been mentioned in the Viiv publicity material, it's not a major factor. The new platform is less about targeting hardcore gamers, and more about winning a space as the home entertainment hub.

'Intel is betting that the buyers of Viiv machines from HP, Gateway, Sony and others won't be using them to play games, at least not the heart-pounding, multitexture rendering first-person shooters. For that, they can use Intel's buddy machine, the Xbox 360,' said graphics analyst Jon Peddie.



▲ Intel is likely to certify the Xbox 360 as compatible with its new Viiv consumer PCs.

in Windows gaming', according to product manager Kelly Stannmore.

TRAY AND PLAY

It's understood that Windows Vista will be crucial in this area, with a Games item up-front in the Start menu and a centralised approach that will make games easier to find, update and patch.

'Tray and Play' is a major theme, the idea being that you drop your game disc into the drive, Windows Vista installs crucial files and

caches data, then has you playing within the shortest time possible. And while the Xbox 360 might have the graphics upper hand initially, this won't last forever. Recent demos of Crytek's Direct X 10 engine showed lighting, interactive jungle environments, realtime soft shadowing and particle effects that even next-generation consoles will struggle to match.

What's more, the Xbox 360 could actually help Windows gaming. Most Xbox 360 peripherals will be cross-platform compatible

with Windows, and Windows Vista is set to adopt the console controller as its standard games device.

The Xbox division's corporate vice president J Allard is also the chief architect of Microsoft's XNA, a next-generation game architecture with a development platform, XNA Studio, described as 'the Visual Studio for Games Development'.

One key aspect of XNA is that it embraces both the Xbox 360 and Windows. It encourages the cross-pollination of software between the two, giving developers a range of tools and a framework in which to use them, so they can make the most of advanced technology and concentrate on what matters most - the games.

In effect, XNA handles the plumbing, leaving developers with more time to spend on game mechanics and distinctive visual effects. XNA combines Windows and Xbox tools, and it's known that DirectX 10 is being developed hand-in-hand with the architecture. In theory, it will make it so easy to develop Xbox 360 games for Windows (and vice versa) that it's practically a no-brainer.

In other words, don't write off Windows gaming yet. The Xbox 360 will affect the PC industry in the short term - the money that might have been spent on a GeForce 7800 might go Microsoft's way instead - but it certainly won't cause a disaster. For PC enthusiasts, the Xbox 360 could be an irrelevance, but it might just be the perfect complement to their existing Windows setup. It certainly won't be an alternative.



▲ Microsoft believes it will become more common for games, such as Ghost Recon Advanced Warfighter, to be developed for both PC and Xbox platforms.

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2D BENCHMARKS

PC Authority's exclusive set of custom-designed benchmarks are based upon real-world, industry-standard applications. We run scripts to give each program a set amount of work and measure, to the nearest one-hundredth of a second, how long it takes to complete the task. We reboot between tests to prevent any caching.

Not only does this reflect actual performance as meaningfully as possible, it's done to a level of plus or minus 0.5 percent accuracy, putting other benchmarks to shame. They're also the only benchmarks that can convey the multitasking and encoding benefits of dual-core processors.

We divide the tests into four categories to reflect real-world usage: Office, 2D Graphics, Encoding and Multitasking. We use Microsoft Office, Adobe Photoshop, CorelDRAW, Discreet 3ds Max, Canopus ProCoder and Illustrate dBpowerAMP to test a system.

We record the time taken to complete each test and, using our Pentium D test rig as a baseline, calculate a relative score. So, a machine scoring 1.50 is 50 percent faster than our reference machine. The overall benchmark score is an average of each category.

TEST RIGS

Abit AL8 motherboard with 1GB PC2-4300 Crucial RAM for Intel, Asus A8N-SLI motherboard with 1GB Crucial PC3200 RAM for AMD; 10,000rpm WD Raptor hard disk; NVIDIA 6600 GT graphics.

3D TESTS

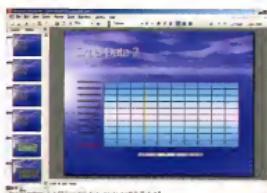
We use pre-recorded demos in Half-Life 2, Far Cry and Doom 3 to test real-world 3D gaming performance. They're tested at 1280 x 1024, 32-bit colour depth, with 4x anti-aliasing and 8x anisotropic filtering, or at 1600 x 1200 with High Dynamic Range (HDR) rendering, as appropriate.

NOTEBOOK BATTERY LIFE

We subject notebooks to two battery tests. The first sees how long the notebook could stay on if idle. The screen is set to a minimum readable level and all processor power saving is turned on. Then, to test under intense conditions, we run a complex multitasking job until the battery runs out.

STAR RATINGS

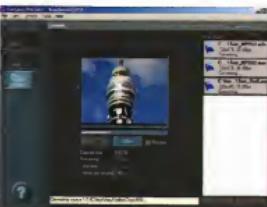
EXCELLENT	★★★★★
VERY GOOD	★★★★★
GOOD	★★★★★
AVERAGE	★★★★★
POOR	★★★★★
DREADFUL	★★★★★



▲ The office test uses Microsoft Office 2003, with a number of tasks in Access, Word, Excel and PowerPoint.



▲ A complex scene in 3ds Max 7 measures a machine's computational performance.



▲ Encoding two streams of video simultaneously makes use of Canopus ProCoder's multithreading.



▲ Turning on HDR lighting in Far Cry makes the graphics better yet.

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View from the labs

Core blimey

I should have sensed something was up when I walked into a meeting a couple of months ago. Intel was announcing its new philosophy on benchmarking (it was concerned that too much of the industry was relying on synthetic benchmarks – and quite rightly too). However, all of the questions were about the imminent release of what was then called Yonah – what we now know to be Core.

At the time everyone believed it to be a evolutionary step up from the Centrino platform and dismissed it as predictable. More talk centred around what Intel was going to do in the face of the widespread consumer perception that AMD desktop processors were far more desirable than Intel ones. Looking back on it those self-assured grins on the marketing guys faces weren't just forced smiles born from years of marketing spin – they had something up their sleeve. They just couldn't tell us yet.

But the engineers behind Core were somewhat nonplussed. Intel's techies only described Core as a minor evolution from the Pentium M. Our man who was at Core's technical briefing put it thus: 'All Intel has done is squeeze two enhanced Pentium M cores onto a single chip, change the architecture so they can share 2MB of Level 2 cache, and at the same time lower the power demands of the CPU so that it can run at an average of 1.1W. A fine technical achievement but all in a day's work for someone whose IQ probably approaches 200.'

What this actually meant, however, was that our test notebooks blitzed our CoreDRAW, Office 2003 and Photoshop tests faster than Intel's top-end desktop processor. And, as our man points out, if you put that in a notebook it would burn the Intel logo into the palm of your hand within five minutes.'

Now AMD needs to start looking over its shoulder. While Intel has ruled the notebook

world for a while now, Core processors are seriously going to change our desktop PCs too. The reason so many PCs are as big as they are is because of the heat generated by the processors. If the processor suddenly requires less cooling to a proportionately massive degree, PCs are going to shrink in a big way and it's only reasonable to assume that whole new applications will spring up to do that.

It's all very well creating the best-value fastest processors, but AMD will need to possess more than this kudos in the market. The ball's now firmly in its court.

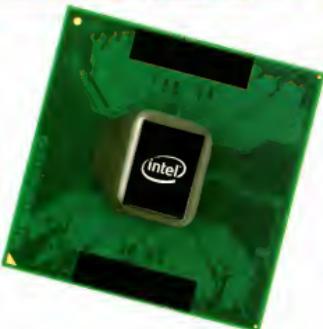
We Need Your Help

Regular readers will be aware that our policy of printing real-world best prices alongside our reviews has only been going for a few months now. When we started printing them, instead of the traditional RRP, cynics said that many online sellers would cynically send us artificially low prices that would either not be honoured or made

'Our test notebooks blitzed our tests faster than Intel's top-end desktop processor.'

up for by higher delivery costs. In short, people would submit cheaper prices just to get their name in the magazine.

The delivery issue was rendered irrelevant by our printing of delivery costs – although we recognise that people living in the back of beyond will always have to pay a bit more than metropolitan dwellers. However, we didn't rule out prices being submitted which would then not materialise – and with over 80 resellers polled each issue it's only likely that some won't operate



▲ Intel is no longer a 'processor' company, it's a platform company.

in good faith as we would like.

Later in the year we'll offer a survey which will allow you, the readers, to say what you think about the reliability and service of these outlets but for now we'd like to hear from you regarding your experiences. If you've bought anything (or tried to buy anything) from a company listed in our magazine, please let us know how the transaction went. Have prices listed in the magazine proved to be unobtainable? We've had few complaints so far.

It's still a new system and things will get better as time moves on and experience improves. In the meantime we must credit the likes of www.advancesoftware.com.au, www.digitalcityonline.com.au, www.pc.net.au and www.implx.com.au for making a real effort to offer our readers low prices and good service.

NICK ROSS, LABS EDITOR

THANKS TO...

It requires a whole host of supporting products to review our PCs, notebooks, components, peripherals and software each month. So a big thank you goes out to AMD, Asus, WD, Crucial, Internode, Unwired, Draytek and Belkin for providing their products and services to our Labs.

NEXT MONTH



► If you're like us, then you don't trust PCs as far as you can throw them when it comes to looking after your crucial data – whether it be vital account information or baby photos. So make sure you don't miss our roundup of backup software next month.

If you're even more like us, then you have a huge amount of information that you want to carry around with you all the time. Why carry a laptop or separate PDA in addition to your phone? Next month be sure to check out our roundup of PDA phones.



Intel Core

It may be just an evolution from the Pentium M in terms of the technology, but the Core Duo is a ground-breaking chip. **PC Authority** takes a journey to the core.

It takes something special to make Intel introduce a new name for its processor.

In the last 10 years, we've seen only the Celeron and the Xeon, as the all-new Intel Core promises something special. Here, we'll explain the technology behind the chip, what this means in terms of performance and the impact the new chips could have on notebook and PC design.

The Core is actually two new processors – the Core Solo and Core Duo. Based on the core formerly codenamed Yonah, they're making their debut in notebooks and form the heart of the new Centrino platform. As the names suggest, the Core Duo processor has two execution cores, continuing Intel's drive toward multicore processing and multithreaded applications. The Solo has just one core and will find its way into lower-cost machines.

Intel's current roadmap includes Pentiums for several months to come, but the chances are that either this or the next generation of Yonah will become the primary desktop processor too, finally ousting the Pentium for all mainstream applications.

The technology

The Core Duo processor isn't simply two Dothan Pentium M cores combined on one die. The Core is a significant evolution, although its architecture is heavily based on the previous 90nm generation. Along with the new Presler-coded Pentium Extreme Edition, the Core processors are the

first models to be fabricated using Intel's newest 65nm process.

The clichéd comparisons to the width of a human hair are now more or less redundant – 65nm (0.0065 of a millimetre of a metre) is in the same order of size as a virus and significantly smaller than bacteria. This has helped Intel fit two cores onto a die only slightly larger than that of the latest

'Intel has fitted two cores onto a die only slightly larger than that of the latest Dothan-cored Pentium M.'

Dothan-cored Pentium M (90mm² as opposed to 84mm² for the older part). Although not quite the miraculous feat it might sound – most of the area of the die is taken up by the same 2MB of Level 2 cache – it's still an impressive piece of engineering, and the total transistor count has increased by 11 million for a total of 151 million overall.

What is truly impressive, however, is the fact that, despite having double the cores, the total power consumption of the Duo has remained largely consistent with the Pentium M.

This is partially thanks to the 65nm process, but substantial savings have come from a raft of incremental measures like power saving and performance factors.

Power-saving features

Put simply, the Core's smaller transistors mean lower drive current per transistor and thus lower power consumption. It isn't all plain-sailing, though. As transistor sizes have decreased, problems with leakage current have increased. The practical upshot of leakage current is that even when a transistor is nominally switched off it still wastes

energy. But Intel has invested heavily in developing ultra-low-leakage fabrication techniques for the 65nm parts that require them.

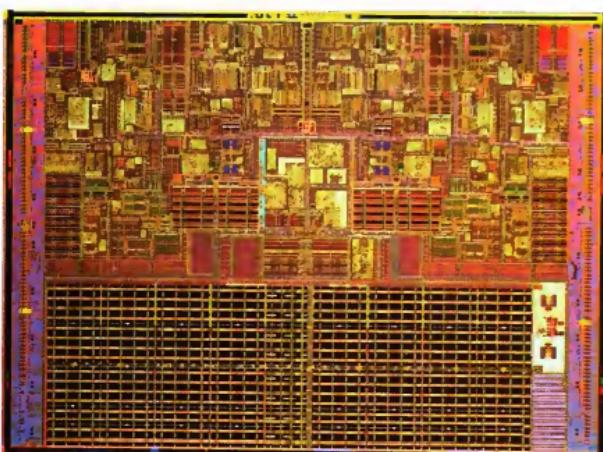
Core also introduces Dynamic Cache Sizing. This is a power-saving measure that allows the processor to flush out the contents of the cache to main memory. The areas of cache that have been cleared can then be switched off until needed again. In addition, flushing the whole cache to memory allows each core to go into a lower-voltage Deep Sleep mode. Previously, there needed to be a voltage safety margin to ensure the integrity of cache data, but once it's been flushed to system memory that requirement is removed. The result is a new Enhanced Deep Sleep power state (known as a C state) for even lower idle power consumption.

Finally, both cores can be at different C states, allowing one core to sleep while the other continues to work. It isn't possible for the two cores to dynamically alter their clock frequency or voltage though. When either core isn't sleeping, it must work at the same speed and voltage level as the other. The standard SpeedStep ability to reduce the clock speed and voltage of the processor as a whole is still there.

Performance improvements

In keeping with Intel's stated aim of increasing performance by design rather than via ever-higher clock speeds, the numbers relating to the Core processor's basic specifications look broadly similar to those of the Pentium M. There's the 2MB Level 2 cache, plus a range of raw clock speeds that more or less match those of the Pentium M, extending up to 2.16GHz for the fastest part. The only bigger number of note is the 667MHz FSB frequency, matching the maximum RAM speed the Mobile 945 chipset is capable of supporting.

Other performance improvements come from smarter design features that don't boil down to simple numbers. One of the advances Intel is most proud of with Core Duo is its Smart Cache



▲ Intel squeezes two physical cores onto a die just a fraction larger than the Pentium M, and the end result is a fantastically fast and power-efficient processor.

system. Although the 2MB Level 2 cache is shared between the two cores, it isn't the fixed 50 percent split that we've seen in previous multicore technology. The Duo's Smart Cache allows the CPU dynamically to allocate its cache between the two cores. Up to 100 percent of cache can be dedicated to either core so, if one execution core is idle, none of the cache capability is wasted.

More cache means fewer cache misses and less recourse to main memory, keeping the working core running at its best efficiency. Intel also claims that the central shared bus with both cores use improves power efficiency by reducing round-trip traffic to the chipset's front side bus.

On a purely performance front, Intel's SSE3 instruction-set extensions have had a makeover, dubbed Digital Media Boost. Intel hasn't introduced SSE4, but it has made optimisations to integer divide operations – one of the most common and computationally intensive operations for most number crunching tasks. It has also improved SSE instruction decoding to allow all three instruction-decode units to handle SSE2 instructions.

Finally, the new CPUs have better thermal sensing, with a dedicated digital temperature sensor per core in addition to the relatively crude thermal diode fitted to all current Pentium designs. While this may not seem terribly exciting, the ability to monitor temperature more accurately should help notebook manufacturers to produce the most compact notebook designs possible without needing to build in too much of a cooling safety margin. It could also have the same benefit for those manufacturers putting Core CPUs in quiet living-room PCs.

Performance testing

Collating the benchmark results from the two review systems we've looked at this month, as well

The New Names

Intel has bravely decided to abandon the confusing numbered naming convention it introduced with the Pentium M. Instead, there's a brand-new confusing numbered naming convention, albeit one that makes a little more sense if you concentrate hard.

The processors are explicitly divided into power as well as performance classes. The LV and ULV suffixes to denote low voltage and ultra-low voltage have been replaced with the single-letter prefixes L and U. Processors that are neither L or U are now prefixed with T to denote performance orientation over absolute power saving.

Within each power class, the higher the number, the more performance-orientated features the processor has. All Duo processor numbers (for instance, the T2600) start with a '2', and Solo numbers with a '1'.

This does lend some limited weight to Intel's continued plans to market the Pentium Extreme Edition and Pentium D as media-creation processors, but it's clear that for the majority of applications the Core processor is superior.

The future

Intel already has a marginally faster T2600 2.16GHz part in its line-up that we've yet to see, and 2.5GHz won't be long in coming as the new 65nm fabrication facilities are shaken down and yields improve. The first server chip based on 65nm technology, codenamed Sossaman, will be here before the end of June,

and the rumours are it will be strongly based on the Yonah core.

After that, the next generation will be hitting the streets as early as the second half of this year. The next-generation core will be based on Yonah, but will introduce an even shorter instruction pipeline as well as HyperThreading and EM64T support, with a complete suite of CPUs currently codenamed Merom, Conroe and Woodcrest for notebook, desktop and server platforms respectively.

And although Intel is claiming that it still has plans for the Pentium name, many are predicting the introduction of the new technology with Merom and its brethren will mark the official death of the Pentium name as Intel finally admits – or at least tacitly implies – that the NetBurst architecture of the Pentium 4 was ultimately a disappointment and that its own notebook-processor technology is far superior.

The confusing part is that the numbers are only consistent within each power class. So while it might seem intuitive that an L2400 Core Duo would be faster than a T2300, in fact they operate at the same clock speed (see table below) and, while we've yet to test either of those parts specifically, we'd be very surprised if the L2400 was actually faster.

FAMILY	NAME	SPEED
Core Duo	T2600	2.16GHz
	T2500	2GHz
	T2400	1.83GHz
	T2300	1.66GHz
Core Duo (low voltage)	L2400	1.66GHz
	L2300	1.5GHz
Core Solo	T1300	1.66GHz

What it all means

The chief and immediate benefit of the Core Duo is clear – slim, light, dual-core notebooks with similar levels of battery life as the previous generation of Pentium M offerings. Intel is already claiming around 50 percent more 'design wins' – that is, notebook chassis designed for Core – than the first version of the Pentium M.

Even if you don't want a top-end notebook, the Core Solo should find its way into extremely affordable machines, and they'll still be fast, svelte and, hopefully, boast decent lifespans away from the mains. The Core surely paves the final nail in the coffin of ugly, bulky chassis and heralds a new era of stylish, light notebooks for everyone, not just the elite.

It's no coincidence that the Core has been released at the same time as Intel's Viiv Technology either. The low power demands of the new processor make it an ideal choice for compact living-room PCs that will need minimal cooling.

And as outlined above, we can see absolutely no reason why the Core or its successor won't be powering almost every Intel desktop PC in the very near future. This will lead to huge economies of scale, which should be passed on to us in the form of lower prices. Combine that with tangibly more responsive systems that are also quieter, and it should be no surprise that we've already dubbed this an 'astonishing chip'. It truly is.

David Fearn

■ For an exclusive look at the first Core-based notebooks turn to page 80.

■ The Core is a central part of Intel's new Centrino platforms too. Turn the page for a look at its other elements.

■ And, for a look at how Intel plans to use Core in its latest digital home initiative, Viiv.

'We can see no reason why the Core or its successor won't be powering almost every Intel desktop PC in the very near future.'

as a 'white box' sample notebook from Intel itself, it's obvious that the performance of Core Duo is impressive. It could comprehensively outclass the current top-end Extreme Edition Pentium in the very near future.

As it is, the 2GHz T2400 sported by the Acer TravelMate 8204WLMi powers it to a score of 1.11 overall. That's an 11 percent performance boost over a 3.2GHz dual-core Pentium D, and remember that's from a laptop fitted with a notebook hard disk as opposed to the 10,000rpm Western Digital Raptor in our benchmark reference PC.

Looking at the results, the Acer fell behind in only two of seven application tests, taking an average of six minutes to complete our video encoding benchmark as opposed to five minutes and 16 seconds for our reference PC, and it was also marginally slower at rendering our 3ds Max 7 test frames. Then again its time of five minutes and 23 seconds makes it a mere 3 percent slower.



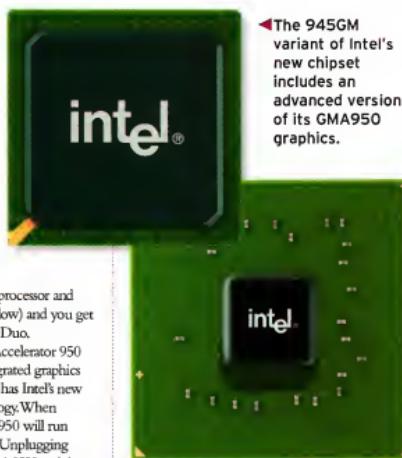
Intel Mobile 945 Express

There were no prizes for guessing that the chipset in the new dual-core version of Centrino would be named the Mobile 945 Express – it follows the route laid down by the desktop dual-core Pentium D.

As with previous Centrino variants, there are three flavours: 945PM is the plain mobile chipset, 945GM adds integrated graphics, and 945GMS is the ultra-low voltage chipset with integrated graphics. Combine one of these chipsets with a Core processor and the new Intel wireless card (see below) and you get either Centrino Solo or Centrino Duo.

The updated Graphics Media Accelerator 950 (GMA950), which forms the integrated graphics of the 945GM and GMS variants, has Intel's new Dual-Frequency Graphic Technology. When plugged into the mains, the GMA950 will run at its maximum 400MHz at 1.5V. Unplugging the notebook drops the voltage to 1.05V and the frequency to between 250MHz and 133MHz.

It's a limited form of SpeedStep for graphics, and very welcome for thin and light notebooks. You won't be playing the latest 3D gaming titles on it, but there's more than enough power for any 2D task at high screen resolutions. The GMA950 also now boasts its HDTV credentials by bringing



► The 945GM variant of Intel's new chipset includes an advanced version of its GMA950 graphics.

in support for the High-bandwidth Digital Content Protection (HDCP) standard.

There's also what Intel has christened Dynamic Video Memory Technology, which assigns shared system RAM to the GPU according to the size of frame buffer needed. This is a much more efficient

arrangement than simply setting 64MB in the BIOS, which could leave you wanting in Windows.

Performance is improved elsewhere by support for the new 667MHz front side bus, up from 533MHz for the Mobile 915 Express and Pentium M. There are two memory channels for greater bandwidth so long as there's DDR2 SODIMM module in each channel. The Mobile 945 can address up to 4GB of system memory despite 2GB SODIMM modules not being available yet.

Adjacent to the 945M north bridge is the ICH7M south bridge, which has an Intel High Definition Audio codec, with its ability to stream disparate audio sources simultaneously. You get eight USB ports, one parallel and two Serial ATA connections, which should be enough for any notebook. There are only four PCI Express lanes, and with the wireless LAN card taking one and the Intel Gigabit Ethernet connection another, system builders will have to share these between options such as docking stations or ExpressCard slots.

Intel will allow any of its dual-core processors into the Vivid platform, so Core Duo with a Mobile 945 chipset qualifies. However, Intel has another south bridge for this use, which gives six PCI Express lanes and a hardware controller for the Intel Matrix Storage feature, allowing for more complex RAID arrangements. So while the Mobile 945 chipset great news for work on the go with its power-saving and performance-enhancing features, it could also power your living-room entertainment.

Clive Webster

Completing the Centrity

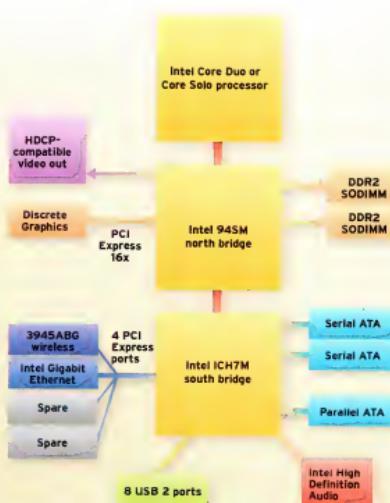
As with previous versions of Centrino, the Duo or Solo varieties specify Intel's own wireless cards. In this case, it's the Intel PRO/Wireless 3945ABG. The biggest change here is the inclusion of the 802.11e extension, which specifically integrates Quality of Service. Access points generally serve all-comers on a first-come, first-served basis, doling out bandwidth to each station as and when asked. This isn't ideal for Voice-over-IP or media streaming, as it leads to glitches or stuttering video playback.

The guarantee of bandwidth is accomplished through extensions to the existing Media Access Control layer, primarily by introducing Traffic Classes. Instead of a file download being classed equal to a VoIP call, for example, the call's data packets are recognised by the access point as being higher priority.

In contention-free periods, the router can use the Hybrid Coordination Function to poll stations with the permission to send data. This can be done in any order to prioritise high-priority traffic, and stations can transmit multiple packets sequentially if necessary. This gives high-priority traffic guaranteed access to available bandwidth, while lower-priority traffic will queue.

The new WLAN card should create less interference, as 802.11e specifies that aerials must not leak signal into other channels. Also handy is the intelligent AP selection, with the choice based on available bandwidth rather than basic proximity. When roaming too, your notebook will switch to better sources.

► Centrino notebooks with a Core Duo inside will use a dedicated Centrino Duo logo.



► The Mobile 945 chipset brings faster bus speeds and SATA to the Centrino table.



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- Intel® Wireless 802.11g Integrated
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- 128MB ATI Mobility Radeon X700 Graphic Chip
- Music Audio Player - Play music/mp3 without turning on the notebook!
- DVD±RW Dual Layer
- Microsoft Windows® XP



MACRON PW70

- Intel® Centrino® Mobile Technology
- Intel® Pentium® M Processor
- Intel® Wireless 802.11g Integrated
- 17" Super Bright Wide Screen
- 256MB ATI Mobility Radeon X800XT Graphic Chip
- Music Audio Player - Play music/mp3 without turning on the notebook!
- DVD±RW Dual Layer
- Microsoft® Windows® XP

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Intel Viiv Technology

We go behind the headlines to reveal what makes up Intel's new Digital Home concept – and why this time it might just work

If you've already taken the plunge with a Media Center PC, you may well have got away with minimal fiddling in making it working smoothly. But if you've tried to get it working seamlessly with a wireless network, media servers or multiple devices, you'll already be able to define 15 different types of frustration. And that's where Viiv (rhymes with 'five') comes in, launched at the Consumer Electronics Show (CES) in Las Vegas in early January.

Intel's latest initiative is promising to unify and simplify people's experience of digital media. That means music, film and digital photography for starters, as well as those more esoteric 'services', delivering everything from online shopping to weather forecasts and news. At face value all you need to know as a consumer is that two Viiv-certified products will work with each other. But take a look underneath the marketing gloss and the mechanisms at work are more complex.

Viiv is a new 'platform', made up of a set of specified Intel hardware and software, as well as what the company likes to call 'an ecosystem' of related third-party hardware, software and services. In the same way that Centrino helped

'notebook' become 'wireless notebook', Intel wants Viiv to become synonymous with digital home components (not just PCs) that 'just work'. It's a significant challenge.

It's not the first time Intel has done this, though – much of Centrino's alleged \$300 million marketing budget was actually spent on validating technology to ensure that Centrino-validated hotspots and hardware 'just work' together. But that was only the beginning, and the Viiv platform is more ambitious again. This time, Intel has to vouch for products and services that it hasn't actually developed. That's a complex, expensive and time-consuming process.

When Viiv was first discussed at Intel's Developer Forum last year, it was broadly assumed that this was yet another attempt to sell the living-room PC concept. But in a notable departure from previous attempts to make the PC into a consumer item, the emphasis, as with Centrino, is on achieving a set of functions rather than simply trying to pretend it's not actually a PC. Intel is at pains to point out that this platform isn't just about sitting 10ft away from the PC and enjoying the abstracted interface either.

In fact, at the initial launch, Viiv doesn't have much new to offer either the networked digital home setup or the 10ft experience. This is just the first wave – the second half of 2006 will see an extension of Viiv to integrate it more fully into a networked environment.



▲ The new Viiv logo won't just adorn PCs, but certified products like wireless routers as well.

The Hard Stuff

In terms of basic hardware requirements, a Viiv-certified PC must use any one of Intel's current dual-core CPUs and accompanying chipsets. That's the 945, 955 and 975 Express Chipset families, along with the Pentium D and Pentium Extreme processors, or the brand-new Intel Core Duo. Given the astounding performance of Core, and that Viiv is intended to usher in a new era of sleek and quiet consumer PCs, the choice to include the Pentium family at all is

Ecosystem

Verified Portable Devices

Verified Networked Media Devices

Verified Services and Apps (10ft interface)

Verified Services and Apps (streaming to connected devices)

Windows XP Media Center Edition 2005 Operating System

Q2 2006

Q1 2006

Intel Viiv Technology-Based PC

Intel High Definition Audio & audio codec

Intel Quick Resume Technology

Intel Matrix Storage Technology

Intel PRO Client LAN

Intel Hub Connect Technology

Intel Viiv Zone & Intel Viiv Media Server

Intel Pentium D Processor

Yonah Dual Core Processor

Intel Pentium Processor Extreme Edition

Intel 945/955/975 Express Chipset Families

▲ A Viiv PC not only needs a dual-core Intel processor and Windows Media Center 2005, but several other technologies unique to Intel.

a slight surprise, but it does at least offer system designers some choice.

The other hardware-based requirements are largely provided by the specified chipsets, but Intel is drawing a line in the sand with their specification. They must include High Definition Audio, the Intel PRO Client LAN (a wired 10/100 or Gigabit Ethernet controller) and Intel Matrix Storage Technology. The latter incorporates a RAID controller allowing sophisticated setups across two or more disks, including virtual striped and mirrored volumes, as well as support for SATA disks and NCQ (Native Command Queuing).

However, they're joined by another, more

on-the-fly. In practice that would mean converting something like DivX video to MPEG2 automatically if MPEG2 is the only format the device can handle, neatly sidestepping compatibility issues.

Are you being served?

All the infrastructure in the world won't attract consumers though, and it's with the actual content that Intel is being really ambitious. With Centrino, the bait was evident in the form of wireless Internet browsing, but with the digital home there's still a long way to go with both content and perception.

We already have a fair sprinkling of online

'Viiv is a new 'platform', made up of a set of specified Intel hardware and software, as well what the company likes to call 'an ecosystem' of related third-party hardware, software and services.

revolutionary development – Quick Resume. In combination with drivers that will only come as part of the Viiv PC platform, this allows PCs to switch on and off almost instantly (after the initial boot). In truth, it's a form of the Suspend and Resume power states, but it feels much more like a consumer electronics device. There's also what's been dubbed 'Visual Off' mode, which immediately powers off video and audio, but leaves other subsystems active, allowing you to continue to stream media or start a scheduled recording without interruption.

The Soft Touch

There's only one third-party piece of software specified for a Viiv PC, but it's a significant one for the end user – Windows Media Center Edition 2005 (along with its attendant remote control). Microsoft's 'premium Windows experience' may have had a shaky start, but the recent Update Rollup 2 has finally made it a stable and attractive option. Aside from the current lack of direct support for a free Australian Electronic Programme Guide, it offers an unparalleled number of features, capably handling everything from digital music and digital photography to sophisticated PVR features and online services.

Intel has also announced plans for a substantial software upgrade in the second half of 2006. This will include its Hub Connect Technology, essentially a simplified method of securely networking devices together, aimed at bringing the networked elements of Viiv within reach of the non-technical.

There will also be the Intel Media Server. Similar to Microsoft's Windows Media Connect (an optional Windows component), it's this software that handles the arbitration between a networked media device and the storage device. Dealing with requests for indexes, media information and the media itself, Intel's version goes further than Microsoft's offering by handling conversion to standardised codecs

music stores, but that's just the beginning. Not only is Intel promising developments in on-demand TV, but access to Hollywood-level movies, music video downloads and high-profile gaming services, as well as online applications for photo and video editing.

Each one of these services will be vetted by Intel to make sure it will work seamlessly with any Viiv PC or relevant Viiv-certified devices. If you've seen Media Center's slow-burning Online Spotlight feature, you'll get the idea. MCE's offerings currently include services ranging from Gallery Player, which allows you to view library images of artwork and nature photography for a monthly subscription, to free video-on-demand services. You'll also find Napster, as well as add-ons such as a karaoke service. It's of variable quality, with just enough to keep people coming back for more. But Intel plans to make it a hub for the consumption of digital services. Later in the year, Viiv will add an extra 'Viiv-verified' category to the Online Spotlight section of the interface on Viiv-based PCs.

It isn't just the content providers that Intel has been talking to. So along with names like Sky TV, VirginMega and CAPCOM, content delivery vendors such as Movielink, Canal+ Group and TiVo are being banded around. We'll have to wait to see how successful these services are, but it's the biggest push we've yet seen.

Viiv for all

Given all of this, it isn't surprising that Intel is palpably bubbling over with excitement. There's clearly a good deal of investment here, although it isn't yet clear whether Intel will charge companies to have their products certified and, if so, how much actual take-up of the brand will be seen from hardware and software vendors.

As Intel isn't selling Viiv as a premium brand, we can only see it as a good thing from the consumer's point of view. It raises the bar on what we can expect from a basic PC and should

Coming Soon



AOpen is among the first to bring out a chassis specifically designed for Viiv, in this instance aimed squarely as a consumer electronics device.



We saw our first all-in-one Media Center PC last month in the form of Fujitsu's Deskpower TX (February 2006, page 38), but Intel believes Viiv will make it an even more popular choice.



It's not all about new form factors. Intel sees all of its consumer PCs as coming with Viiv technology inside and complete with an MCE remote. That includes traditional tower designs.



Of the more radical approaches, this tiny concept design was initially shown at IDF and is likely to be taken up by some of the more ambitious vendors.

also take much of the headache from their setup. AMD has also just announced plans to extend its LIVE! initiative – similar in concept to Viiv – to consumer devices in mid-2006. In addition to Microsoft's slated plans to include the Media Center interface into all its consumer versions of Vista, the wilderness years of the media-centre PC are finally over.

Ross Burridge

Acer TravelMate 8204WLMi

PRICE: From \$3999 SUPPLIER: Acer 1300 366 567

DELIVERY: Depends on reseller WEB: www.acer.com.au

EXCLUSIVE

Acer has given the veteran TravelMate chassis a spruce up for its first dual-core notebook. The lid has a carbon-fibre finish to it, and the curved keyboard and gunmetal grey colouring lend it a distinctive look.

Inside, the T2500 Core Duo is clocked at 2GHz and aided by a generous 2GB of DDR2 RAM, which makes the TravelMate the quickest notebook we've ever seen. It scored a remarkable 1.11 in our application

benchmarks. Quite amazingly the 8204WLMi is also 11 percent quicker than a top-of-the-range Intel PC based on the 3.2GHz Pentium D840.

A look at the hard disk brings more good news – a Seagate Barracuda unit with 120GB of space split into two 60GB partitions. Although this isn't as much storage as the impressive 160GB disk from Sony, there's still ample capacity for files and applications. The optical drive is a DVD writer with the capability to write to every single format of writable CD and DVD, including DVD-RAM discs.

The 15.4in widescreen TFT boasts a resolution of 1680 x 1050. That provides tremendous flexibility and will really come into its own under the vector-based nature of the Windows Vista interface. This will render the small-text issue irrelevant should you decide to upgrade later this year.

There's ATI's Mobility Radeon X1600 on graphics duty and, as long as you're happy to abandon the native resolution in favour of

RESULTS



3D SPEED



2D SPEED



OFFICE: 1.22 2D GRAPHICS: 1.07
ENCODING: 0.99 MULTITASKING: 1.15

BETTER

Sony VAIO VGN-FE11S

PRICE: About \$3000 SUPPLIER: Sony 1300 72 0071

DELIVERY: Depends on reseller WEB: www.sony.com.au

We were fortunate to get our hands on Sony's first Core Duo notebook this month. It's a pre-production model and at the time of going to press, Sony could not confirm its name. As such the VGN-FE11S moniker may change when it becomes widely available.

The cool white keyboard, curved edges and black surround to the LCD make the Acer look a little less chic. What's also slightly surprising is the price – we'd traditionally

expect Acer to beat Sony for value, but the Sony promises to beat Acer by around \$1000.

Unfortunately, the Sony didn't perform as well as we'd expected in our benchmarks. Sporting a 1.83GHz Intel Core Duo T2400 CPU and 1GB of PC4200 RAM it scored only 0.89 in our benchmarks overall – we'd hope for that to improve in production models.

There's also a 5400rpm hard disk, but it boasts a huge 160GB capacity – the biggest we've yet seen. As if this wasn't enough, the graphics chip, NVIDIA's GeForce Go 7400, also makes its debut here.

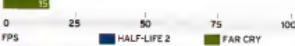
It didn't shine in our standard gaming tests, though – average rates of 17fps and 15fps in Half-Life 2 and Far Cry are hardly cutting-edge scores. You'll have to drop down to 1024 x 768 for playable frame rates.

There are plenty of exciting features elsewhere. Naturally, 802.11a/b/g wireless makes an appearance, but there's Bluetooth and a wired Gigabit Ethernet port too. We also appreciate the optical drive, which will write

RESULTS



3D SPEED



2D SPEED



OFFICE: 0.99 2D GRAPHICS: 0.85
ENCODING: 0.86 MULTITASKING: 0.87

BETTER

▲ The TravelMate not only looks good, it also beats all-comers performance-wise.



▲ The Sony is impressive in every area – a cutting-edge CPU, great screen and a massive hard disk.

1280 x 1024, you'll get playable frame rates in most current games. But the primary issue is the sheer amount of heat and noise blasting out of the side when the card is working hard, both of which are at the limits of acceptability.

The imperfect power requirements of the TravelMate meant it struggled in our battery tests too. One hour and 36 minutes under intensive use is reasonable, although the light-use test result of two hours and 53 minutes is slightly more disappointing. But it's debatable how much use you'll get out of the TravelMate on the road anyway. A weight of 3kg and hefty physical dimensions mean that it isn'teminently portable.

The 8204WLMi offers power and svelte looks in abundance, and

if you need an incredibly powerful desktop-replacement notebook laptop, it's very tempting.

However, it's also expensive. The one-year RTB warranty might be international, but for this much money we'd want longer coverage. We expect the Sony to offer tangibly better value for money.

Dave Stephenson

SPECIFICATIONS

2.6GHz Intel Core Duo T2500; 2GB PC5300 DDR2 RAM; 120GB hard disk; LG GSA-40B2N DVD writer; 512MB (256MB shared) ATI Radeon X1600 graphics; 15.4in 1680 x 1050 TFT; 56K modem; Gigabit Ethernet; 802.11a/b/g WLAN; 4 x USB 2 ports; mini-FireWire; 5-in-1 memory card reader; Type II PC Card slot; DVI-I, D-SUB and S-Video out; Windows XP Professional; 1yr RTB international warranty. Dimensions: 365 x 273 x 40mm (WxDH). Weight: 3kg. Part code: 8204WLMi.

LABS VERDICT

A good-looking, amazingly fast laptop. But it's also expensive, heavy and doesn't offer outstanding battery life.

Performance



Features & Design



Value



OVERALL



to all kinds of DVD including dual-layer and DVD-RAM. Interestingly, and in a first for Sony, Windows Media Center Edition 2005 is installed rather than a proprietary, unpopular Sony equivalent. If you can provide a USB TV tuner you can make use of Media Center's TV features.

The ergonomics are good too. The keyboard, although noisy, has a decent amount of travel and makes extended typing sessions easy. The LCD is a 15.4in widescreen model with a resolution of 1280 x 800, but it's still a superb panel. Sony's glossy X-black finish strikes a good balance between sheen and annoying reflections, making it a great choice for watching DVDs or working while on the move.

A light-use battery test result of two hours, 59 minutes doesn't break any records, but it's enough for most commuters, and the 2.9kg weight means you won't be overly tempted to take it everywhere anyway.

For the ultimate in power, the Acer rules – it's simply the fastest

laptop we've seen. But the premium you pay over the Sony isn't worth it for the few seconds you'll save during intensive tasks. The Sony is far more pleasurable to use, and the massive hard disk is another plus. Best of all, at \$3000 it's no more expensive than many single-core notebooks.

Dave Stephenson

SPECIFICATIONS

1.83GHz Intel Core Duo T2400; 1GB PC4200 DDR2 RAM; 160GB hard disk; Matsushita DVD-RAM UJ-850S DVD writer; 256MB nVidia GeForce Go 4400 graphics; 15.4in 1280 x 800 TFT; 56K modem; Gigabit Ethernet; 802.11a/b/g WLAN; 3 x USB 2 ports; mini-FireWire; Memory Stick card reader; external 5-in-1 memory card reader; Type II PC Card slot; S-Sub and S-Video out; Windows XP Media Center Edition 2005; 1yr RTB warranty. Dimensions: 366 x 273 x 26mm (WxDH). Weight: 2.8kg. Part code: TBC.

LABS VERDICT

Good looks, dual-core power and a reasonable price will make the Sony an attractive buy.

Performance



Features & Design



Value



OVERALL



can you connect on the move?

Access your email, the internet and your company server on the move with Vodafone Mobile Connect. It works everywhere you do. Simply slide the card into your laptop and click to connect.

make the most of now with
Vodafone Mobile Connect



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vodafone

Acer TravelMate 3232WXMi

PRICE: \$2499 DELIVERY: Up to \$48

SUPPLIER: www.notebooksrus.com.au WEB: www.acer.com.au

This TravelMate split the field with its styling – some thought the plastic, metallic silver and black chassis was stylish, while others thought it cheap. It's impressively well constructed – hold it with one hand and you'll find a little give in the chassis, but it feels more planned than mere flimsiness. Sit it on desk and start typing and it feels rock solid. At just 2.1kg, you won't mind lugging it around either.

In day-to-day use there's little about the TravelMate that will leave you wanting more. The 14.1in widescreen LCD not only lends the machine an eminently portable form factor, but offers tangibly more desktop real estate with its 1280 x 800 resolution. It's also bright, crisply defined and has viewing angles

RESULTS

BATTERY



2D SPEED



OFFICE: 0.77 2D GRAPHICS: 0.82

ENCODING: 0.67 MULTITASKING: 0.53

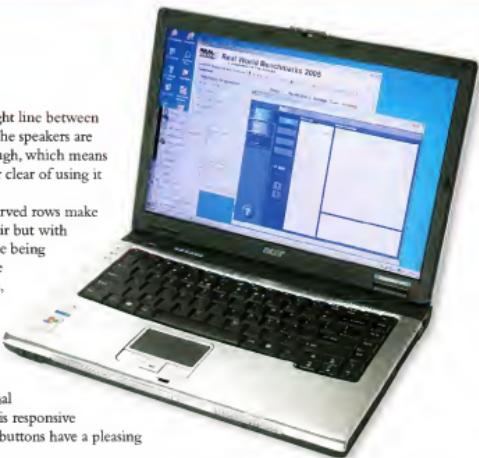


that tread just the right line between clarity and privacy. The speakers are incredibly tinny though, which means that you'll want steer clear of using it as a jukebox.

The keyboard's curved rows make typing a pleasant affair but with Backspace and Delete being crammed in with the page-navigation keys, you'll frequently end up randomly hopping around a document or accidentally deleting the occasional letter. The touchpad is responsive and even the mouse buttons have a pleasing solidity to them.

It's powered by a reasonable 1.7GHz Pentium M and 512MB of memory which led it to a score of 0.70 in our tests – more than capable for day to day usage. Just note that the Intel 915GM chipset won't allow for 3D games. Lasting four hours in our intensive test and four and a half hours in our light-use test was more reasonable, though.

While the price and specification make



▲ With a solid construction and a gently curved keyboard, the TravelMate feels as good as it looks

the 3232WXMi a reasonable business option, the company doesn't have quite the pedigree of corporate security and support as Dell, Lenovo or Toshiba. There's no Trusted Platform Module or fingerprint reader, although Acer's

Fujitsu Lifebook P7120

PRICE: \$2649 (contact navig@digitalcityonline.com.au) DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au WEB: www.fujitsu.com/au

Every month one product stops everyone in the office in their tracks and this month it's Fujitsu's Lifebook. The chassis is genuinely tiny yet feels incredibly solid and well built – the metallic plastic casing barely flexes at all when you pick it up or flex the screen.

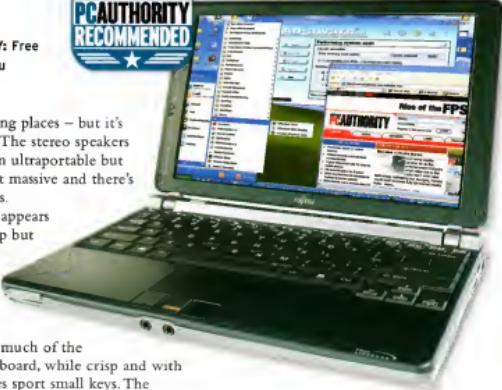
And what a screen! While only 10.6 inches, the 1280 x 768 widescreen resolution is incredibly bright and sharp. The horizontal viewing angles approach 180 degrees though the vertical performance is more mediocre. Watching HD video was a joy and was enhanced by the glossy coating which impressively cuts out reflections. However, there was a little

lag in fast moving places – but it's not distracting. The stereo speakers aren't bad for an ultraportable but the volume isn't massive and there's virtually no bass.

The desktop appears remarkably crisp but at this size it's not for those with limited eyesight. In fact, the word 'small' sums up much of the P7120. The keyboard, while crisp and with nice action, does sport small keys. The mouse is small as are its accompanying buttons. While we quickly got used to it, others will struggle with the close arrangement – full size keyboards on ultraportables from Dell, Lenovo and Toshiba are certainly more comfortable for lengthy typing.

But the P7120 still has an ace up its sleeve with its internal DVD+writer which supports dual-layer DVD+R and DVD-RAM. Only Sony has managed this feat in a tiny notebook before. Next to this

PC AUTHORITY RECOMMENDED



▲ Small, but packed with features, this Lifebook is a stunner.

is a media card slot which supports MS, SD/MMC and xD cards and a USB port. The battery takes up the back but on the left are D-Sub, S-Video, modem, Ethernet, PC Card, mini FireWire and two more USB ports. The front sports two audio jacks while surrounding the keyboard is a fingerprint reader, WLAN switch (for

RESULTS

BATTERY



2D SPEED



OFFICE: 0.68 2D GRAPHICS: 0.61

ENCODING: 0.47 MULTITASKING: 0.41



Empowering Technology suite does encompass system backup and recovery – as well as power management – in a comprehensive and easy-to-use manner. Also of note is Acer's GridVista software, which divides the Desktop into several discrete zones, allowing you to lock windows into them.

Rounding off the specifications, there's 802.11a/b/g LAN and BlueTooth, controlled by sturdy orange and blue backlit switches on the front plus wired Gigabit Ethernet and a 56K modem. The back is home to just the power input and a single USB port, while a further two USB ports, a Type II PC Card, D-SUB and S-Video outputs, infrared and mini FireWire ports are housed on the left-hand side. There's also a media card slot which supports MS, SD/MMC and xD cards. On the other side is a dual-layer DVD writer, while 60GB of hard disk space is reasonable too.

So the TravelMate ticks just about every box for day-to-day usage but it fails to set the world alight – a decent graphics chip would have helped. But this is still a decent notebook for the price that will suit those who want a bit more than Compaq's budget A-List offering and a bit less than its bulky big brother, the Aspire 9504 (page 56).

Ross Burridge and Nick Ross

802.11a/b/g connections) and a power saving 'Eco' button.

The latter automatically drops brightness and shuts down power to the hard disk, PC card and optical drive depending on how you've set it up. With it all turned on the battery lasted a massive eight hours. In our intensive test with no power saving it ran our multiple applications test for a very impressive five hours.

Indeed, the low power usage runs right through the spec of the machine. The processor is a 1.2GHz Pentium M ULV (Ultra Low Voltage) which limits performance. Coupled with 512MB of RAM (8MB of which is reserved for graphics) it proved to be 54 percent as fast as our dual-core desktop – not ideal for hard core encoders but plenty fast enough for most office and multimedia applications. However, the Intel 915GM graphics chip won't play games.

At \$2649 it's good value too and, as ever, we're impressed

with Fujitsu's environmentally friendly fabrication. The warranty of three years RTB with only labour included in the last two years is not quite the onsite luxury that we've seen elsewhere. The undersized keys and its lack of power stop it from knocking Dell off the A-List, but this is a mighty good smaller alternative.

Nick Ross

SPECIFICATIONS

1.2GHz Pentium M 740; 512MB PC2-4200 RAM; 60GB hard disk; Matsuta UJ-8325 DVD writer; Intel 915GM graphics; 14.1in 1280 x 800 LCD; 56K modem; Gigabit Ethernet; 802.11a/b/g WLAN; BlueTooth; InfraRed; mini FireWire 3 x USB 2; Type II PC Card slot; D-Sub; S-Video out; memory card slot supporting MS, SD/MMC and xD; Windows XP Home; 1yr international C&R warranty. Dimensions: 335 x 240 x 32mm (W/H/D). Weight: 2.1kg. Part code: FL50

LABS VERDICT

From the solid construction to the decent performance, this mid-range notebook packs in decent quality and good value.

Performance

★★★★★

Features & Design

★★★★★

Value

★★★★★

OVERALL

★★★★★

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SPECIFICATIONS

1.2GHz Intel Pentium M 753 ULV; 512MB PC2-4200 RAM; 60GB hard disk; Dual-layer DVD-RAM writer; Intel 915GM graphics; 10.6in 1280 x 768 LCD; 56K modem; 10/100 Ethernet; 802.11a/b/g WLAN; 3 x USB 2; Type II PC Card slot; VGA out; S-Video out; Windows XP Professional; 3yrs RTB Warranty (2 are labour only); Dimensions 271 x 210 x 24mm (W/H/D). Weight 2.1kg. Part code FPC020750K.

LABS VERDICT

What it lacks in power and, to some extent, practicality, it more than makes up for in design and pure gorgeousness.

Performance

★★★★★

Features & Design

★★★★★

Value for money

★★★★★

OVERALL

★★★★★

vodafone.com.au


vodafone

Acer's desktop replacement packs features and value

Acer Aspire 9504WSMi

PRICE: \$3249 (contact navid@digitallyonline.com.au) DELIVERY: Free

SUPPLIER: www.digitallyonline.com.au WEB: www.acer.com.au

Acer is in a bullish mood, at the moment producing a range of good-quality products at aggressive prices. On the LCD TV front, the 32in AT3201W became Australia's top-selling television – from nothing – in just two months (*November 2005*, page 96). This 17 inch widescreen desktop replacement shows similar promise.

The core components of the 9504WSMi consist of a 2GHz Pentium M and 1GB of PC4300 RAM. We can't argue with this amount of power in a notebook. Its score of 0.83 in our application benchmarks is just 17 percent slower than a top-of-the-range dual-core Pentium D desktop.

There's the 100GB hard disk that will house plenty of video and music files before needing archiving, and a Panasonic dual-layer DVD writer that burns DVD+R discs at 8x. There's also Gigabit Ethernet and 802.11b/g WLAN to complement the Bluetooth, while five USB ports are scattered



as MCE, it's easy to understand and looks good. There are even shortcut buttons on the front of the chassis. By pressing the Arcade button (on the chassis or remote), you can quickly boot into a Linux version without waiting for Windows to load.

Powering the 17in widescreen panel is the capable Mobility Radeon X700 from ATI. It may not be the fastest GPU around but it's plenty for most people. The standard test scores of 26 and 23fps in Half-Life 2 and Far Cry are at extremely tough settings, including 4x anti-aliasing and 8x anisotropic filtering. Turning off AA and AF and running Far Cry at the native 1440 x 900 produced a very playable frame rate of 40fps.

The LCD uses Acer's CrystalBrite glossy screen technology. In the office, we weren't overly distracted by reflections from the lights. In fact, the Desktop benefits from the vividness of the CrystalBrite screen as much as DVD and videos do.

'There are some unusual features that help the 9504WSMi stand out from the crowd.'

around the sides of the chassis for extra convenience.

There are also some more unusual features that help the 9504WSMi stand out from the crowd. These include the integrated hybrid analogue/digital TV tuner. The supplied aerial extends to 28cm and packs away to something solid and small enough to be portable. We tested it out in central Sydney without success, but Acer also includes a standard aerial input lead and AV leads, so using the 9504WSMi as an entertainment centre at home is a viable option.

Then there's the Bluetooth VoIP phone that charges in the Type II PC Card slot. We were disappointed when it came to testing, though. The microphone wasn't sensitive enough to pick up our voice clearly even in the setup tests. We found ourselves reverting to the built-in dual microphones and stereo speakers. Two remote controls are provided. The smaller one controls the Acer Arcade media management application and has all the basic functions, such as volume control.

Once into the Media Center-like interface, you have everything you need, including music, video, DVD and TV. While the options aren't as extensive

▼ 2GHz of Pentium M power gives this notebook more processing power than many desktop PCs.



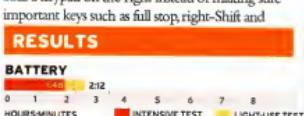
as the MCE, it's easy to understand and looks good. There are even shortcut buttons on the front of the chassis. By pressing the Arcade button (on the chassis or remote), you can quickly boot into a Linux version without waiting for Windows to load.

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RESULTS

BATTERY



3D SPEED



2D SPEED



▲ The glossy screen makes watching films a treat, and there's 100GB of storage too.

Enter are of a decent size. While this was a constant bugbear, the general quality of the keyboard is good. The trackpad and mouse buttons also smack of quality – there's no need for a mouse.

The chassis has a plastic finish but feels robust – not surprising since it weighs in at almost 4kg. Battery life isn't its forte either – it managed just over two hours even under light use. If you decide to take it on your travels, you'll appreciate the international collect-and-return warranty, although it does only last a year.

While it can't match the A-Listed ITC Metalbox for raw power, this Acer notebook still offers considerable grunt and superior entertainment features for some \$1500 less. If you're fed up with the space a desktop PC takes up or just want a powerful mobile computer, it certainly makes a great choice.

Clive Webster

SPECIFICATIONS

2GHz Pentium M 760, 1GB PC4300 DDR2 RAM; 100GB hard disk; Panasonic UJ-8450 DVD writer; 256MB ATI Mobility Radeon X700 graphics; 17in 1440 x 900 LCD; V90 modem; Gigabit Ethernet; digital/analog AVerMedia Hybrid TV tuner; Bluetooth; 802.11b/g WLAN; 4-in-1 memory card reader; Type II PC card slot; ExpressCard/54 slot; D-SUB, DVI-D and S-Video outputs; S-Video in; RF connector; 5 x USB 2.0 ports; parallel port; Bluetooth VoIP phone; 2 x remote controls; portable digital aerial; Windows XP Home SP 2; 1yr international C&R warranty. Dimensions: 402 x 285 x 44mm (WxD). Weight: 3.7kg. Part code: D070.

LABS VERDICT

A solidly built laptop with many entertainment features, including an integrated digital TV tuner and a bright, clear display. Power and quality that won't break the bank.

Performance



Features & Design



Value for money



OVERALL



Everybody should have one.

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Phone, PDA or laptop?

i-mate JasJar

PRICE: \$1499 DELIVERY: \$13

SUPPLIER: www.minidigital.com.au WEB: www.imate.com

It's a sign of the times that the first device to use Microsoft's new Windows Mobile 5 isn't a plain PDA, but a fully fledged mobile communications device. It brings new meaning to the word connected, with Wi-Fi and 3G the undisputed highlights, and GPRS, tri-band GSM and Bluetooth in support. But the JasJar's real party trick is that it can be used as both a standard palmtop and a clamshell device – just like a convertible tablet PC, you swivel the screen round 180 degrees and fold it back upon itself.

This immediately lends the JasJar a 'wow' factor, and you should be similarly impressed when you start typing on the keyboard. Although not suitable for touch-typing, it's ideal for two-thumb typists and a major step beyond the 'thumbboards' included with BlackBerrys or HP's Mobile Messenger (see A-List). We wouldn't want to bash out a 2,000-word report on it, but managed several detailed emails without getting frustrated. What's more, the keyboard becomes backlit once you start typing, making it usable even in the dark.

The keyboard brings it head-to-head with Nokia's Communicator series, but anyone switching over will miss the wider screen of Nokia's device. The JasJar's 640 x 480 resolution is fantastic for viewing photographs and fine detail in web pages, but when typing away in Word Mobile and Excel Mobile we longed for a wider screen.

Don't get too excited about the prospect of these new Windows Mobile 5 apps either – there's still no support for password protection or formulae (in Excel) for example. We do like Excel Mobile's charting ability though, and the inclusion

of PowerPoint Mobile for viewing presentations is welcome.

But don't expect a BlackBerry-like experience. Unless you buy a third-party package such as GoodLink, you'll have to manually hit Send/Receive to check for new mail. Microsoft will be delivering push support via a Service Pack for Windows Mobile imminently, but this will still depend on Exchange Server 2003 being in place. And it's still a long way from the out-of-box experience you get with a BlackBerry.

Where the JasJar wins over the BlackBerry is its flexibility. Quite apart from the huge number of applications available for Windows Mobile devices, web browsing is far more pleasant. Your favourite sites may not look exactly like they do on your PC, but most of the information – the exception being multimedia – will be available to view. It gets even better if you're in a 3G area, with the browsing experience resembling broadband rather than the narrowband of GPRS. You can even use the JasJar as a wireless modem for your notebook,

'Where the JasJar wins over the BlackBerry is its flexibility.'

linking over infrared, USB or Bluetooth. Setting this up is frustratingly difficult though, and we had to resort to web forums for advice.

The JasJar has more skills too. The 1.3-megapixel camera takes impressive photos if the lighting conditions are right, and can take videos at 320 x 240 resolution. Being a 3G phone, it naturally supports video calls too. We also found it an excellent voice recorder – especially using the hands-free set – with clear results.

As an MP3 player, it does show some weaknesses. The volume wasn't loud enough in noisy environments and browsing tracks is far too fiddly. At least you'll be able to listen to DRM-protected tracks if you synchronise your music via Media Player 10.

This highlights another problem – battery life. Listening to music and browsing the Internet simultaneously, we found the JasJar fell from 99 percent to 85 percent after half an hour. It doesn't retain its charge too well if just left alone either. It dropped from 66 percent to 40 percent in the course of 24 hours.

At least the nightmare of losing all your data just because it runs out of juice is now history. The JasJar uses flash memory for both ROM and RAM, so even if you left it in a drawer for three years your details would still be there. The other



▲ A PDA-phone with a twist – one second it looks like a normal PDA, the next you can start typing on a full QWERTY keyboard.

bonus is that the JasJar can charge over USB.

In palmtop mode, there are surprisingly few shortcut buttons available. You can accept or reject calls via buttons on the left-hand side, but otherwise you're limited to activating the camera or voice dial.

But let's make one thing clear – this isn't a small device. It towers over a standard Pocket PC and dwarfs a mobile phone. At 22mm thick and weighing 286g, it won't fit easily into trouser pockets and will create an unsightly bulge in a jacket. It's not the most natural phone anyway – you'll get some strange glances when you clamp the JasJar to your ear. That said, voice quality is perfectly good whether you use it with the supplied hands-free kit or not.

The JasJar won't be for everyone. You'll need a concrete reason for such a large keyboard, as devices like HP's Mobile Messenger also allow you to quickly dash off emails yet retain pocketability. And if you just need to view information, smartphones are a much more obvious choice. But if you'll take advantage of all of the JasJar's skills, it's a well-executed device that offers unparalleled flexibility.

Tim Danton

SPECIFICATIONS

520MHz Intel PXA270 processor; 64MB RAM, 128MB ROM (91MB total available); 640 x 480 transmissive TFT; SD/MMC card slot; 1.3-megapixel camera; infrared; Bluetooth; GSM/GPRS tri-band phone; Windows Mobile 5 for Phone. Dimensions: 79 x 22 x 132mm (WHD). Weight: 286g.

LABS VERDICT

An incredibly flexible device, the JasJar will help you keep in touch no matter where you are. The inclusion of 3G, Wi-Fi and a keyboard lift it to a new level.

Performance



Features & Design



Value



OVERALL



▲ When browsing the Web, it's often easier to use the JasJar in its palmtop mode.

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HP Pavilion f2105

PRICE: \$1079 **contact:** nativ@digitalcityonline.com.au **DELIVERY:** Free
SUPPLIER: www.digitalcityonline.com.au **WEB:** www.hp.com.au

With a competitive price, stereo speakers and an integrated USB hub, the Pavilion makes a fantastic first impression. The 21in widescreen panel boasts a native resolution of 1680 x 1050. Once you've



▲ The HP excels in both games and movies, but is just as effective when displaying spreadsheets.

edited a huge spreadsheet on this monitor, or viewed two A4 Word documents side by side, it's very difficult to go back to 1280 x 1024.

A 12ms grey-to-grey response time theoretically puts the f2105 at a disadvantage compared to some 4ms panels, and there was some faint smearing in our tests. However, games looked superb. The panel retained detail in dark areas, with even the darkest greys remaining visible against a black background.

Colour performance was good, but this screen isn't intended for highly accurate colour reproduction across the gamut. Its viewing angles are good. There was a slight drop-off in brightness beyond 45 degrees.

We were also pleased with the OSD. Clear and large, we had no difficulty finding and using the tools we wanted. The integrated USB hub boasts a pair of USB ports, but the stereo speakers sound like a laptop's, distorted at high volume and lacking punch for bass notes.

The styling of the HP split the office, with roughly halfliking the silver finish to the bezel, and the other half declaring it looked cheap. The chunky hinge attaching the panel to the stand came in for particular criticism, but does make the f2105 height and tilt adjustable.

This screen is equally suitable as a monitor for entertainment, or to make viewing multiple applications or spreadsheets easier on the eyes. It's this versatility, plus its extra inch in size, that might make it a better choice for you than the super-cheap Philips 200W6 (see A-List). However, the difference in price – almost \$200 – means it can't quite dislodge the Philips from the A-List.

Dave Stephenson

SPECIFICATIONS

21in widescreen TFT; 12ms response time; 300cd/m² brightness; 900:1 contrast ratio; 1680 x 1050 native resolution; 1 x D-SUB input; DVI-D input; 2 x USB ports; 2 x 5W stereo speakers; TCO 03 certified. Dimensions: 588 x 465 x 287mm (WDH). Weight: 9.2kg.

LABS VERDICT

The price brings 21in widescreen LCDs into the mainstream, yet the f2105's image quality challenges the best.

Performance	★★★★★
Features & Design	★★★★★
Value	★★★★★

OVERALL

★★★★★

LABS VERDICT

A cheap yet good-quality widescreen panel that's equally suited to the home or office.

Performance	★★★★★
Features & Design	★★★★★
Value	★★★★★

OVERALL

★★★★★

ViewSonic VA1912w

PRICE: \$482 **DELIVERY:** From \$24
SUPPLIER: www.pc.net.au **WEB:** www.viewsonic.com.au

Widescreens are great for working on – the extra horizontal pixel count gives you more spreadsheet cells, or lets you hold two documents side by side for quick fact checking and editing – not to mention the fact that they make games and films look great. They've always been an extravagance though, and there won't be many office IT departments that will accept them as a standard roll-out option. But this latest offering from ViewSonic might begin to change that.

At this price, the VA1912w is cheaper than many standard-aspect 19in panels (including the A-Listed VX924). It would be natural to expect a few compromises in return, but after running through our demanding DisplayMate tests we were pleasantly surprised. The few flaws we saw were minor at worst. For example, there's a slightly restricted colour gamut at the high end, which means this isn't the ideal panel for anyone needing colour accuracy. But there's nothing to stop you enjoying using the VA1912w day to day, or when viewing photos.

With these encouraging results, and the widescreen resolution, it's also well suited to movies and gaming titles that support wider aspect ratios. With a resolution of 1440 x 900,

You'd expect a 19in widescreen panel for less than \$500 to be full of compromises. Not so with the VA1912w.

it's actually a 16:10 aspect ratio, so movies don't quite fill the entire screen. The high contrast range results in rich colours, while we saw minimal lag during fast motion.

It's equally at home in the office, with a light-diffusing layer rather than the glossy screens that come with many panels these days. That does reduce the initial impact when looking at media, but makes long spells in front of it less fatiguing.

The only real disappointment is the speaker bar below the panel itself. We didn't expect much, but it's particularly tiny and lacking in volume. Still, it isn't as if ViewSonic has increased the price of the VA1912w to include it. And while the housing may not add much glamour, the TFT panel itself is good enough for even reasonably demanding uses. The aspect ratio is a boon, particularly on a monitor so cheap. All in all, you're left with a fantastic bargain, with barely any compromise.

Clive Webster

SPECIFICATIONS

19in widescreen TFT; 8ms response time; 300cd/m²; 500:1 contrast; native resolution 1440 x 900; D-SUB and audio inputs; TCO 99. Dimensions: 452 x 211 x 416mm (WDH). Weight: 4.4kg.



LG M2343A

PRICE: \$2050 DELIVERY: \$15

SUPPLIER: www.scorpotec.com.au WEB: <http://au.lge.com>

The ambitiously designed M2343A hits a sweet spot with a 23 inch widescreen diagonal – big enough for movies, but not overpowering. There's superb build quality throughout and a decent set of connections at the back, hidden under a removable panel. Two scart, composite video and S-Video ports cater for most AV equipment, with analogue D-SUB and DVI-I inputs for connecting to a PC. The latter isn't HDMI compatible, so you won't be able to watch DRM-protected footage, although the native resolution of 1366 x 768 will support HDTV formats up to and including 720p.

Our technical tests revealed a wide colour range, with light and dark shades exhibiting good separation at extremes. Colour handling is weaker, with significant banding in both colour and greyscale ramps. Real-world testing proved kinder, with the high brightness giving images real impact. Contrast was acceptably good too, with blindingly bright whites and charcoal blacks. The 8ms response time equated to a smudge-free experience in action scenes, but viewing angles are disappointing, with contrast tailing off rapidly past the 45-degree point. The integrated 7W speakers are loud, and the SRS-WOW algorithm is pleasingly immersive.

The menu system is fiddly using the side-mounted buttons, with the remote control the best way to access the flexible picture-in-picture options and child lock. Setting up the integrated analog tuner is simple, but it is looking old with the move to digital.

LG is calling this an 'LCD monitor with TV functions' but – aside from our technical concerns – we'd have our reservations about using it on the desktop. Not only does it take up a lot of room – 285mm from front to back – but you'll also need to take the brightness way down to be comfortable.

As a media front-end, the ravishing looks and dazzling brightness are tempting, but the technical issues and poor viewing angles ultimately rob this panel of an award.

Ross Burridge

SPECIFICATIONS

23in widescreen LCD TV; 8ms response time; 600cd/m² brightness; 550:1 contrast ratio; native resolution 1366 x 768; DVI-D, D-SUB, composite video input; component video input; UHF aerial; 2 x scart; integrated 7W stereo speakers; VESA wall-mount compatible. Dimensions: 598 x 285 x 465mm (WDH). Weight: 11.5kg. Part code: M2343A.



▲ Great looks partner a stunningly bright screen.

LABS VERDICT

Good performance and styling are let down by technical quirks and poor viewing angles.

Performance



Features & Design



Value



OVERALL



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A stylish home for a media centre

SilverStone Lascala LC16B-M

PRICE: \$352 DELIVERY: Free to \$30

SUPPLIER: www.auspcmarket.com.au WEB: www.silverstonetek.com

Designing an entertainment PC is a big challenge. But as we've seen with Media Center PCs in recent months, it's more feasible than ever to welcome a computer into your living room.

There are some excellent chassis emerging too. SilverStone's Lascala LC16B-M is one of the most appealing, with a Vacuum Fluorescent Display (VFD), media control buttons and a swish-looking dial. The aluminium chassis will house a full ATX or microATX motherboard and full-sized power supply, allowing you to specify exactly the system you want.

The sleek simplicity on the outside belies the bewildering complexity once you get the lid off – you're greeted by a jumble of wires that seems too complicated for even the most generously equipped motherboard. The main culprit is the VFD, which uses a floppy power connection and re-routes the power switch through itself. Using the integrated IR sensor, this has the benefit of allowing you to

a disappointing oversight.

Once you've removed the drive cages and grouped the wiring, the optical drive is the only really fiddly aspect. The assembly sits centrally, hidden behind a spring-loaded door, but trying to get the eject mechanism to work well was tricky with our flush-buttoned drive. Once working, there's an elegant soft-closing mechanism.

SilverStone bundles two pieces of software from SoundGraph (www.soundgraph.com). The first, iMedia, is a media centre front-end, handling TV, radio, video, music and photos. Compared to Microsoft's MCE, it's extremely basic. It supports only a single analog tuner, and browsing around for media files simply isn't anywhere near as sleek or satisfying.

The second is iMon, a tray app that handles the infrared, VFD and transport



With a stylish aluminium finish, integrated screen and dedicated transport buttons, the LC16B-M is well featured inside and out.

under the front of the case. SilverStone has even cut a side vent for a further 80mm fan. You can fit normal height graphics cards in this case, though SilverStone claims it can't handle ATI X1800 or NVIDIA 6800/7800 cards due to their heat output. It can comfortably handle four hard disks though, and with 500GB drives new to market that gives a 2TB storage ceiling.

Building a media centre PC is usually a tough job. That's part of the fun, but while a year ago you could put in a lot of effort and end up with mediocre results, now you can build impressive systems in half a day.

Despite its shortcomings, this case makes an excellent basis for a media centre, with plenty of room for storage, a full-sized graphics card, and opportunity for quiet cooling. The LCD adds interest, while the transport buttons add flexibility. Only the flimsy volume wheel and VFD software let it down, leaving the LC16B-M as the best media case we've yet seen.

Clive Webster

SPECIFICATIONS

ATX case; 5.25in external drive bay; 4 x 3.5in internal drive bays; 4 x USB, FireWire, headphone, microphone; 2 x 80mm fans; IR remote. Dimensions: 425 x 430 x 172mm (WDH). Part code: LC16B-M.

LABS VERDICT

A well-featured and beautifully made case that's ideal for media-centre systems, although SilverStone does miss a couple of opportunities to make it even better.

Performance



Features & Design



Value



OVERALL



'The sleek simplicity on the outside belies the bewildering complexity once you get the lid off.'

power on the system from standby using the remote. There's also a USB lead feeding out of it, which you can either connect to a spare motherboard header using the supplied adaptor or, more inelegantly, route out the rear and into a USB port on the backplane.

There are also several front-panel connectors hidden by a panel underneath the VFD, offering four USB, a single six-pin FireWire and audio ports. Unfortunately, the cables connecting to the USB ports don't carry any power, so charging MP3 players, cameras or external hard disks from them isn't possible –

▼ Even fully built, the internals are spacious enough to allow for easy access and plenty of flexibility.



buttons, as well as allowing you to comprehensively reconfigure the remote control. It's a touch confusing to operate, and didn't behave as expected. The most logical use for the LC16B-M's wheel would be to scroll through Media Center menus, providing an intuitive method of navigation without a remote or keyboard. Not only flimsy, it's actually linked to volume, and pressing it activates mute. Considering there are already volume buttons underneath, it's a waste.

We were more impressed with the remote once we'd fiddled with the iMon settings. You can assign it to launch Media Center. Then it does everything that a standard MCE remote does and controls all the iMon applets and extras. This includes the LCD panel, letting you select whether it shows a graphic equaliser, a newsfeed, email updates or system resources. While not totally customisable – you can't import your own RSS newsfeeds, and it can't show the date in a proper dd/mm/yy format – it's reasonably useful. The remote can also control your mouse pointer, jump to various parts of Media Center and do anything else you'd expect from an all-in-one remote.

The twin 80mm exhaust fans are remarkably quiet although we're surprised they aren't 120mm. SilverStone quotes them as producing only 21dBA – quieter than an average living room – and we believe it. They expel a healthy amount of air, which is drawn in through vents

SLI in a small barebones case?

Shuttle XPC SN26P

PRICE: \$890 DELIVERY: \$20

SUPPLIER: www.dolicoaustralia.com WEB: <http://au.shuttle.com>

Considering the full-sized SilverStone chassis comes with disclaimers that it can't handle a single 7800 GeForce graphics card, it's a huge claim by Shuttle that this tiny 218 x 330 x 200mm (WDH) box can cope with the heat of two running in SLI. If true, this chassis virtually consigns the ATX midi-tower to the scrap heap.

Once you've popped off the outer shell, there's a surprising amount of room within. With the drive bay removed, there's plenty of space to unscrew the CPU heatsink and install the two sticks of RAM (maximum 2GB), while all the cables come pre-attached. While this slightly robs you of the 'I made this' feeling, it's still preferable to 'I tried to make this and can't get it to work' situation.

Shuttle claims that the SN26P will handle the thermal throw-off from any pair of 7800 cards, be they GTs or GTXs. Thanks to the 110nm transistors, a 7800 consumes less power than a 6800 and therefore produces less heat too. We used

optical drive. After half an hour of fiddling, we found that standing the drive on its end while holding the slide-rails and dropping the cage down onto them worked best. We could then adjust the front-button mechanism left or right to ensure it pressed against the button of our optical drive. Drives with buttons flush against the front surface may cause problems, but some ingenuity (sticky tape and a small rectangle of cardboard) will overcome that.

A hard disk can be mounted underneath the optical drive or suspended from a clip-on mechanism above it (or both). We used our test Western Digital Raptor disk and suspended it over the optical drive to benefit from the cooling of the rear fans. Shuttle has attached all the cables you'll need and routed them incredibly



▲ Not happy with squeezing 7.1 audio and Gigabit Ethernet onto the motherboard, there's also two PCI Express 16x graphics slots for SLI.

'We teamed two 7800 GTXs with an AMD X2 4800+ to push this XPC as far we could.'

a pair of 7800 GTXs, although a GT will throw off a similar amount of heat, as it draws only 10W less power at peak load. Although the cards are just 10cm shorter than the chassis itself, we still had enough room to juggle them into place. There's no room for double-height cards though, and ours used the stock NVIDIA heatsink, which exhausts hot air away from the backplate.

After such an easy build to this point, we had a satisfying wrestle with the sliding mounts for our

neatly around the chassis.

A final check through the manual (the first time we'd picked it up) confirmed everything was in place. We used the button on the rear panel to clear the CMOS, and the system booted first time.

We wanted to push this XPC as far we could, so we teamed our two 7800 GTXs with an AMD X2 4800+, the hottest Socket 939 CPU around. Idling along in Windows Desktop, we hardly heard a sound from the sideways-blowing fan, or from the two stock coolers on the 7800 GTXs. However, when powering up our HDR Far Cry test, we soon hit significant problems. The fans on our cards just couldn't keep the GPUs cool in such cramped conditions. After roughly a minute, frame rates dropped to single figures. After a few attempted fixes, we removed the cards for closer inspection only to find that one had become so overheated that the plastic decoration on the heatsink had melted. Even the PCBs were hot to the touch.

This is a great shame, as the tiny motherboard has all you need for a powerful PC. There's Gigabit Ethernet, plus a FireWire port at the front and back. There are plenty of USB ports too, and the onboard 24-bit VIA Envy24 eight-channel audio codec negates the need to have a PCI slot for a sound card. It's a good job there are so many integrated controllers though, as after two graphics cards have been installed there's no room for expansion cards.

This is where the puzzle of SLI economics comes in too – there's no point in putting two 6600 GTs in SLI, as a single 6800 costs the same, gives identical performance and has

better upgrade potential. Similarly, there's no point getting two 6800s, as a single 7800 will outperform them and offer the better upgrade path. But if there's no guarantee that two 7800 cards in SLI can run in this chassis, the SN26P is all but pointless.

The SN25P offers the same ease of build, excellent integrated controllers and port positioning. It has a PCI Express 1x slot instead of two 16x, and if you choose not to use this you could invest in a double-height 7800 card that exhausts from the rear. A single 7800 (GT or GTX) offers plenty of gaming performance too – Far Cry ran at 55fps with HDR and 8x AF turned on with no reliability problems. And, as it's \$300 cheaper, it is a much better choice for a tiny high-end system.

Clive Webster

SPECIFICATIONS

Socket 939 barebones chassis; 350W power supply; 2 x PC3200 DDR RAM; Shuttle motherboard; NVIDIA nForce4 SLI chipset; 3.5in internal drive bay; 3.5in internal/external drive bay; 5.25in external drive bay; 2 x PCI Express 16x slots; 6 x USB; 2 x FireWire; Gigabit Ethernet; VIA Envy24 8-channel audio; digital S/PDIF in; optical and digital S/PDIF out; serial port. Dimensions: 218 x 330 x 200mm (WDH). Part code: SN26P.

LABS VERDICT

SLI in such a small case sounds too good to be true, and for the most part it is. We'd rather stick to the single-card graphics of the SN25P and save \$300 into the bargain.

Performance



Features & Design



Value



OVERALL



▲ The pre-routed wiring is extremely neat.

The sound of silence

Zalman TNN 300

PRICE: \$906 DELIVERY: \$20 - \$50

SUPPLIER: www.digitalyes.com.au WEB: www.zalman.co.kr

The TNN 300 is the smaller sibling of the much larger TNN 500A – a gargantuan piece of metal that will house your PC without the need for active cooling. Like its bigger brother, the TNN 300 works by effectively acting as a giant heatsink – the TNN stands for Totally No Noise. The processor and graphics card are connected to the sides of the aluminium case with copper heatpipes. As these core components heat up, the heatpipes ferry extra heat to the sides of the case. These are ridged to increase surface area and, given sufficient ventilation, the heat escapes into the room.

While the TNN 500A allows you to create virtually any specification of PC, there are compromises with the TNN 300. Although it's about the same size as a standard ATX case, the heatpipe assembly for the processor takes up so much space that only a microATX motherboard can be fitted.

Also, Zalman only guarantees the TNN 300 to work with processors with a TDP (Thermal Design Power) of 70W or less. That precludes using any dual core processors, Athlon 64 processors over the 3500+ and current Pentium 4 processors. A Northwood 2.8GHz Pentium 4 is rated at 70W – any faster and you're on your own. All Pentium M chips are fine. We were also discouraged from using a top-end graphics card as, with only three heatpipes coming from the graphics

With room inside for a microATX motherboard, your options are left wide open.

card cooler, there simply isn't enough cooling. Zalman has provided for those who want to build a system with a bit more power, though – there's a mounting for a 120mm fan at the back, which should provide enough active cooling for faster processors. You'd still have a system without CPU, GPU or PSU fans, which are the main acoustic renegades.

Building a system with the TNN 300 isn't for the fainthearted. We built ours using an even mix of finesse, improvisation and brute force. We suggest a dry run without thermal paste or screws to give an idea of how it will fit together. It would be all too easy to short a motherboard by accidentally bridging electrical contacts with a heatpipe.

Zalman includes CPU mounts for Socket 478, 775 and Athlon 64 processors, plus nine heatpipes, cooler blocks for the CPU and GPU, and even mini-heatsinks to cool the RAM on the graphics card. Prising the heatsink and fan assembly from your graphics card takes steady nerves, but, once done, you'll appreciate the reduction in noise.

And it's a significant drop. Once built, our 2.8GHz Pentium 4 with its ATI Radeon 9800 was totally silent – not bad for a machine that can still handle games. The only moving, and hence audible, parts were the hard disk and optical drive. The hard-disk mounting comes with a heatsink to further reduce heat buildup, plus rubber grommets to reduce vibration and noise. Choose a quiet model, such as the Western Digital Scorpio and you'll hear it only if you put your head inside the case.

Once running, the side of the PC that was connected to the CPU cooler became uncomfortably warm to touch. In fact, it radiates so much heat that you might not want it sitting next to you. SpeedFan (www.almico.com) reported that our 3.4GHz Prescott Pentium 4 (underclocked to 2.8GHz) had reached a frightening 92 degrees Celsius, and after a brief session running on Far Cry the system overheated and shut itself down. However, with the CPU and GPU being cooled in different areas of the chassis, gamers shouldn't need to add too much cooling to make the TNN 300 a near-silent gaming system. We were also impressed when we opened up the system – in spite of the high temperatures on the exterior, the inside of the TNN 300 was cool.

Silent PCs have a natural home in the living room, and to that end Zalman includes an infrared module and remote control for its iMon media-centre-style software – no match for Windows Media



▲ Great industrial looks, fantastic build quality and completely silent.

Center Edition on its own, but a great enhancement thanks to programmable keys and mouse control. And although there's no attempt to disguise the TNN 300 as anything other than a PC, it shouldn't have any problem blending in aesthetically with high-end stereo equipment.

We're not without reservations about the TNN 300 and it's expensive at \$906. Also, coupled with its hardware restrictions, it isn't particularly upgradable. You won't be able to build a particularly powerful system without adding some extra cooling hardware, but if you're looking for a system that will never make noise, the TNN 300's marvellous engineering makes it an obvious choice.

Dave Stevenson

SPECIFICATIONS

Passively cooled microATX case; 350W passively cooled power supply; CPU cooling block; GPU cooling block; 9 x copper heatpipes; hard disk passive cooling mount; optical drive bay; internal hard disk bay; remote control; iMon multimedia software.

LABS VERDICT

It's expensive, and not without its limitations, but this is a stunning piece of engineering that really will make a silent PC.

Performance



Features & Design



Value



OVERALL



Seagate Barracuda 7200.9 SATA

PRICE: \$535 DELIVERY: \$10

SUPPLIER: www.secret.com.au WEB: www.seagate.com

If you keep a lot of media on your PC, the Barracuda 7200.9, which offers 465GB of storage after Windows formatting, is a seriously tempting proposition.

As a SATA 2 drive, the interface allows a bandwidth of 300MB/s, although in practice the mechanics of the drive prevent the Barracuda coming close to this. Using HD Tach we saw a maximum burst read speed of 133MB/s, and a random access time of 14.1ms – comfortably close to Seagate's claim of 11ms. The sustained transfer rate (STR) was 51.8MB/s, which is on a par with the A-Listed Maxtor DiamondMax 10, which scored 53.9MB/s in the same test in our last hard disk Labs (*July 2005, page 90*).

On our 3.6GHz Pentium 4 test rig, we copied 3,967 files (a total of 100MB) in 29 seconds – a write speed of 3MB/s. Writing a single 100MB file took just five seconds – a write speed of 20MB/s. Reading the large files took just two seconds (50MB/s), and the small files took 19 seconds for a read speed of 5MB/s.

Although all of these speeds mean the Barracuda will stand up well to everyday use, it certainly isn't the fastest drive around.

► With a whopping 500GB of space, the Barracuda is currently the biggest single drive you can buy, and the 7,200rpm spindle speed means it's fast too.

Seagate's previous 160GB 7200.8 disk had a large file write speed of 61.3MB/s, and a small file write speed of 9.3MB/s, while its STR speed was 57.8MB/s.

The primary downside for the Barracuda is its value for money. Per gigabyte, the DiamondMax 10 costs 86¢, while the Barracuda costs a quarter more at \$1.07. One factor in Seagate's favour though, is its excellent record of reliability. It's also a quiet runner, being barely audible when in a chassis.

If your system chassis is lacking free 3.5in internal bays, the Barracuda is a decent drive – respectable speeds and lots of storage space make it perfect for media applications, and future-proof for everyone else. But if you can install more than one hard disk at a time, you'll find the same storage and better performance for less cash.

Dave Stevenson



SPECIFICATIONS

SATA 2 hard disk; 500GB capacity; 7,200rpm spindle speed; 8MB buffer; 3408A sound level (quoted); 14.1ms average seek time (measured); 5yr RTB warranty. Part code: ST3500641AS.

LABS VERDICT

A lot of storage, together with good performance make this a tempting drive. But it isn't the best value for money.

Performance



Features & Design



Value



OVERALL



Hitachi Travelstar 7K100

PRICE: \$338 DELIVERY: \$10

SUPPLIER: www.techbuy.com.au WEB: www.hitachigst.com

If your notebook hard disk is feeling the strain, an upgrade is usually surprisingly easy, and may be the ticket to giving your laptop a new lease of life.

The 7K100 has a miniature parallel ATA connection, which supplies both data and power to the disk, and inside the disk are two platters, accessed by four heads. Not only is 100GB the largest capacity you'll currently find in notebook drives, but there's also the 7200rpm spindle speed, which makes the 7K100 the fastest spinning notebook hard disk currently available, along with Seagate's Momentus 7200.1.

The issue though, is whether it's worth the extra cash over its 5400rpm relative, the 5K100, which TechBuy is selling for \$272.

Our technical tests, run with HD Tach, revealed the 7K100 to be slightly quicker. Maximum burst speeds on the drives were virtually identical at 91.8MB/s for the 5K100 and 90.4MB/s for the 7K100, with the random access times of 15.2ms and 17.7ms respectively. The STR (sustained transfer rate) was the telling statistic, with the 5K100's 32.5MB/s paling in comparison to the 7K100's 43MB/s.

But our real-world tests showed the lack of meaningful distinction between the two. We

► Out of space? Refresh your notebook with 100GB of hard disk capacity.

wrote 100MB of medium files (between 800KB and 1MB) to the 5K100 in 8.5 seconds, a transfer rate of 11.9MB/s. The 7K100 did the same test at a transfer rate of 13.8MB/s. Reading the same files from our test disks and writing them onto a secondary disk revealed virtually identical transfer rates – 11.1MB/s for the 5K100 and 11.2MB/s for the 7K100.

Our real-world benchmarks are the best indication of application performance, though. Running our tests on the same laptop and interchanging the cloned disks produced a score of 0.88 for the 5K100, and 0.89 for the 7K100 – a speed increase of 1 percent. There's also a slight battery-life penalty to pay. The 5K100 draws just 0.85W when idle, compared to the 1.1W drawn by the 7K100.

The 7K100 is clearly faster for sustained disk operations. However, even in intensive application use, the performance benefits you'll see for your extra \$66 are very small indeed.

Dave Stevenson



SPECIFICATIONS

Parallel ATA 2.5in hard disk; 100GB capacity; 7200rpm spindle speed; 8MB buffer; 30dB(A sound level (quoted); 15.2ms average seek time (measured); 3yr RTB warranty. Part code: HTST2101D9AT00.

LABS VERDICT

Good performance and capacity, but very expensive compared to other drives.

Performance



Features & Design



Value



OVERALL



Ulead impresses with HDV

Ulead MediaStudio Pro 8

PRICE: \$578 UPGRADE: \$350

SUPPLIER: Ulead via website WEB: www.ulead.com

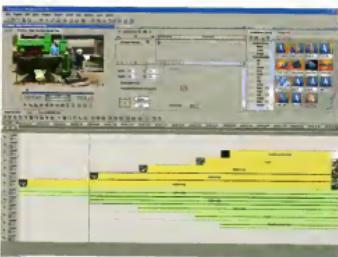
In the early days of PC video editing, MediaStudio Pro (MSP) played a relatively close second fiddle to the now market-leading Adobe Premiere. More recently however, it has languished unloved in Ulead's portfolio. While VideoStudio has developed into one of the best low-cost editors, MSP has been stuck with an interface more reminiscent of Premiere 4.2 than Premiere Pro. Ulead must have realised that radical change was necessary, so at last the company has taken the hatchet.

Although elements of the old program are still visible, the interface has had a complete makeover. Instead of the antiquated system of independent floating windows, all the palettes are tabbed and stitched together, although you can still reposition elements and resize everything. Custom workspaces can be saved with their own hotkey combinations. Alternatively, it's possible to use the default options supplied. The result is much cleaner and easier to navigate. MSP has also finally

new timelines from scratch is a little less intuitive. You have to create a new sequence by right-clicking above the timeline, and then right-clicking again to add it to the main sequence. Ulead has another much simpler method for adding sophisticated multitrack sequences – the Smart Compositor. This calls up a wizard that offers a selection of templates for intros with graphical elements and multiple picture-in-picture elements. Once the wizard has been completed, the results are added to the main timeline as a virtual sequence. You can double-click on this to load it as a nested timeline tab, although you can't get back into the wizard once it's complete.

MSP7 was the first editing software to offer HDV support via a plug-in upgrade. Version 8 builds that directly in, making this the cheapest HDV editing app until Pinnacle Studio 10 arrives.

When editing HDV, real-time performance



▲ The vastly improved interface and HDV editing support bring MediaStudio Pro 8 right up to date.

is again much easier to use. Alternatively, you can import PhotoImpact UFO files or Cool3D C3D files for even more elaborate titles.

The embedded DVD authoring is now based upon MovieFactory 4.2. However, this works as a two-stage process, where you export the timeline to MPEG2 first, then export this to the DVD authoring tool. So it isn't as seamless as Pinnacle Liquid Edition 6's fully integrated menu creation. However, you can encode a 5.1 Dolby Digital soundtrack at the file export stage.

Surround-sound mixing is built in to the audio mixer, allowing you to pan each audio track around the five surround-sound channels. Ulead has also added the SmartSound Quicktracks AutoMusic system – rather cheesy but popular with corporate and event video makers.

In terms of pricing, MSP8 occupies a tough position in the video-editing software market. It's only around \$180 cheaper than Pinnacle Liquid Edition 6, but is significantly more expensive than Adobe Premiere Elements 2 (February 2006, page 57). If you're spending this much on a video-editing app, we recommend the more rounded Liquid Edition. However, if you're already using a previous version of MSP or VideoStudio, it's well worth the upgrade, especially as files from the latter can be imported directly. If you've been put off by previous versions, download the demo and give it a try – a lot has changed for the better.

James Morris

REQUIREMENTS

Windows 2000/XP onwards.

LABS VERDICT

Great value, particularly if you want to edit HDV, and the revamped interface is a huge improvement. An essential upgrade for existing users and as a step up from entry-level software.

Ease of use



Features & Design



Value



OVERALL



'Ulead has realised that radical change was necessary for MediaStudio Pro.'

moved over to single-track editing, so the days of only having transitions between the first two video tracks are over.

In keeping with the more integrated interface, video capture is now built in, although the separate utility is still available. Video can be captured to a wide range of formats, including DV, AVI, WMV and numerous types of MPEG, from VideoCD to HDV, plus there's batch capture for the latter. A DV tape can be automatically scanned, and high-speed scan rates are available (with a compatible camcorder). The resulting batch-capture list may also be saved as HTML, which is handy for planning your edit.

The timeline even supports nested sequences like Premiere Pro, and these similarly appear as tabs above the video tracks. However, adding

▼ The Smart Compositor Wizard helps you take advantage of the nested timeline capabilities.



was no match for Canopus EDIUS 3, and it fell slightly behind Pinnacle Liquid Edition 6 (see A-Lit) as well. On our dual 3.06GHz Xeon test workstation, two HDV streams could be mixed in real-time, but adding a third forced a reduced frame-rate preview. This was certainly functional, and slightly better than what Premiere Pro 1.5 can achieve without the Aspect HD plug-in. You can also use the Proxy Editing feature to work on lower-resolution files for faster performance. However, MSP8 still doesn't use 3D graphics card power to accelerate effects, and not all effects are real-time either.

A host of smaller improvements are also included. The new keyframe manager makes adjusting effects that little bit easier, by giving you all the controls onscreen without needing to open a separate dialog. However, you'll still have to do this if you want to adjust any effect globally. Now, even transitions are fully keyframeable. Using the Keyframe Manager, motion paths can be adjusted with real-time feedback in the preview window. But you still don't get to fine-tune B-Spline paths directly onscreen, unlike Premiere Pro.

Although the filter selection hasn't changed radically since MSP7, there are some important minor upgrades, particularly for colour correction. Full histogram-based adjustment of highlights, mid-tones and shadows is available, with a particularly effective automatic mode. The new Enhance Lighting filter is specifically aimed at under or overexposed footage. The titler receives the same radical facelift as the entire program, and

Supports



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Microsoft Works Suite 2006

PRICE: \$105 for OEM version **UPGRADE:** N/A

SUPPLIER: www.slimline.com.au **WEB:** www.microsoft.com/au

Think 'productivity' rather than 'office', and you'll know what Works Suite is for. It's a bundle of five applications that, while not essential to everyday life, certainly make it easier.

There's Money for planning, Encarta for learning, Digital Image for tweaking your photos, plus a full copy of Word 2002 for letter writing. That's in addition to the basic Works 8, the highlights of which include integrating multiple calendar and contacts folders into Outlook Express, plus a basic database and spreadsheet. However, unlike other countries, Australia misses out on an Autoroute mapping component.

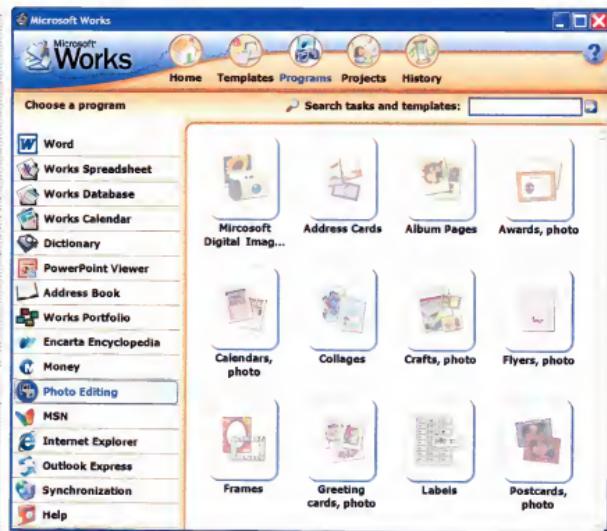
The Suite life

It's all fronted by the Suite launcher, primarily designed to help you navigate the applications on the basis of need rather than function. It will drop you into the most appropriate piece of software for the job at hand. Tell it that you want to write a travel journal and Word launches, or a spreadsheet appears to see what you can afford, or MSN to book a hotel.

This last option is where a few doubts creep in as MSN permeates Works Suite, in places making it feel like a sales tool. Money is dotted with opportunities to compare credit cards or buy insurance. Even so, there's still a tremendous amount here for your cash.

The spreadsheet option foregoes the complexity of Excel in favour of a single-page spreadsheet that understands neither conditional formatting or grouping. It's limited to just over 3.2 million cells, which is sufficient for most, but well short of the 15 million of both Excel and the free OpenOffice 2. Works is, of course, aimed at home use, but

▼ Encarta has a wealth of multimedia features, but we'd like to have seen them more effectively integrated with the text pages.



▲ Works 8 ties the whole suite together, helping inexperienced users choose the most appropriate application for the task at hand.

the spreadsheet's inability to open anything more complex than a solitary sheet of numbers and sums is limiting, and means that it shouldn't be used to edit spreadsheets created at work using Excel

— saving them back out could all too easily rob the originals of their most useful features.

Encarta

In the age of the 830,000 article Wikipedia.org, Encarta's 36,000 entries sound pokey. The lush entries of previous releases have been sobered up for the 2006 Standard Edition, which is now dominated by smart typography and a fading task pane.

There's plenty of multimedia for the taking, although it could be integrated into the main body of work

to much greater effect. Even entries that should be swamped with attractive visuals — such as Pixar or the table of the world's tallest buildings — are tidy, text-only affairs, while in other places the choice of image is poorly thought through.

Search for Microsoft and you'll find the same squinty-eyed shot of Bill Gates that the encyclopedia has used for the past few years. Hunt for Apple, and the picture of its founders is so tightly cropped that Steve Jobs, the current CEO and the man who brought us the iPod (which receives just 29 words before mention of a mysterious iMac GF that we presume should be G5), is only revealed once you expand the picture.

These complaints aside, if you want to use Encarta as a reliable starting point, it's second to none. Copy and pasting applies the proper references to the document in which you use the work, while buying this bundle also gives you free access to the Premium online service for use from any browser, as well as regular updates. On installing, we updated immediately, to receive obituaries for Rosa Parks and Ronnie Barker, both of whom had died recently. It's hit-and-miss though. For instance, we could find no mention of Daniel Craig, who was recently confirmed as the next James Bond.

There's no denying that Encarta remains the best



installable (not to mention reliable) encyclopedia we've tested for years, and it kept us entertained, clicking from entry to entry, for a good two hours.

Digital Image

Digital Image 2006, the suite's photography application, comprises two distinct parts – a library tool and an editor – and both feel like well-established, mature additions.

Library organises your photos, arranging them according to editable metadata variables. A handy parameter painter lets you apply common variables to batches of pictures with a single click, while a rating system allows you to group them by personal preference, and by the time and place they were taken. This is clearly a play for Adobe Photoshop Album Starter Edition, a free download from www.adobe.com/products/photoshopalbum/starter.html.

Microsoft's professional photo-printing service is picky, though. Clicking the link threw up our default browser, but as this was Firefox and not IE we couldn't go further. Manually pasting the link into IE got us one stage further, but it too fell over because it doesn't include the necessary ActiveX controller for picking photos. Once installed, we moved onto the next step, but it again collapsed because of another missing component: 'ActiveX federated upload control from MCL Software Service Inc'. Only after installing that could we add our pictures to a basket. It isn't integrated into Digital Image, but we prefer being able to upload pictures without installing browser control.

Fortunately, the separate photo editor is very good. Its extensive range of one-click fixes really improves your images with a minimum of fuss, and there's even a camera phone auto-fix to brighten and enhance low-resolution images. Each tool drops you into a new task pane, isolating the sliders and dialogs required for the job at hand, saving you the chore of hunting through myriad palettes.

Admittedly, some filters take a wooden-mallet approach to fine-tuning. Auto-colour fixing all too readily desaturated a night-time shot of streaming traffic at the Colosseum. Macromedia Photoshop, on the other hand, preserved the levels of this more or less perfectly exposed shot. Switching to a daytime photo with high contrast though, we actually preferred the Digital Image auto-fix to that performed by Photoshop. So overall, it's a thumbs-up for Digital Image, despite the fact it was missing the Photo Story tool for making narrated slide shows. The Help file explains that this is available only by paying for an upgrade.

Money

And so to the suite's last great element – Money. If ever there was a piece of software that responds well to frequent grooming, this is it.

Money is peppered with links to MSN. You log on using your Passport and it hooks into financial news so it can display a constantly updated record of your stock portfolio, all of which is good. Its help system could do with a refresh as there are some omissions – we were left to work out for ourselves whether some dealings should be added as a standard bank account or an investment.

An hour of gathering and entering data was



▲ Money has good links to MSN, enabling you to keep an eye on the value of your stocks portfolio.

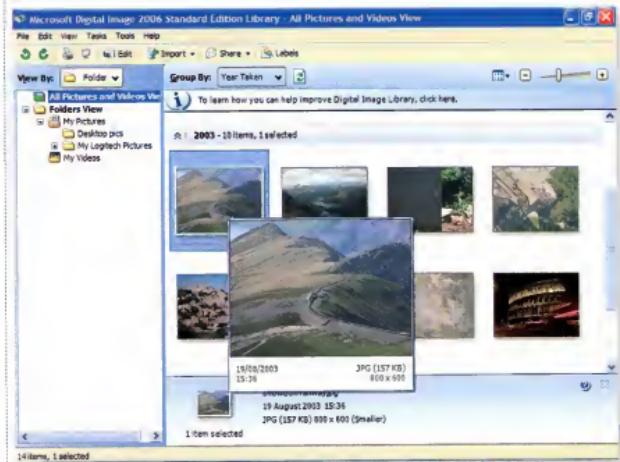
all we needed to get our accounts in order and indeed, discover that we were a couple of hundred dollars better off than we thought, which pays for the software in itself. It was also enough for us to think about moving our accounts to a bank that supported statement downloads once we'd seen just how easy they were to use.

Conclusions

While there are a few too many chops and upgrade nags for an unqualified thumbs-up, Works Suite still walks off with a Recommended award. As a starter suite, it's the perfect combination. The inclusion of a full version of Word 2002 is a real bonus and Money undoubtedly is a star turn. For those novices yet to find their feet with hunting down web-based encyclopedias, maps and printing services, it's a guaranteed pleaser.

If you're after an office suite though, look elsewhere. We recommend Microsoft's own Office suite or OpenOffice 2, depending on your budget and needs, with Works Suite 2006 on hand to organise the more entertaining aspects of your life. In terms of value, sourcing each application individually, comes to well over \$500. The fact that you can buy the OEM version (albeit without a printed manual or fancy packaging) of Works Suite 8 for just \$105 speaks for itself.

Nik Rawlinson



▲ Digital Image simplifies the task of cataloguing your photos and rating them on a sliding scale.

REQUIREMENTS

Windows 98 SE onwards (Encarta only supported on Windows 2000 SP 4 and Windows XP).

LABS VERDICT

Some limitations. Digital Image can be easily overlooked at this price. For casual users, the inclusion of Money and an unrestricted copy of Word 2002 make this an essential buy.

Ease of use



Features & Design



Value



OVERALL



Backup power

Acronis True Image 9

PRICE: \$67 UPGRADE: \$40

SUPPLIER: Acronis via website WEB: www.acronis.com

Where Acronis really pulls away from Norton's Ghost 10 (see opposite) is in its sheer speed and power, particularly when it comes to restoring images, taking around a third less time in our tests.

There's also the unique Snap Restore feature, which lets you boot directly from the disk image while the image is still being restored, and gets you up and running again in seconds rather than minutes. This works by booting a small Linux kernel to restore enough data to reboot into Windows before proceeding with the full restore process. It's even intelligent enough to note if you're trying to launch an application that isn't fully restored yet, and make that restoration a priority.

Disk imaging alone isn't enough for a

You'll need to plough through the documentation, as Acronis doesn't provide the friendliest of interfaces. The Management window is too cluttered, with none of the point-and-click focus of Ghost. Yet, by sticking with the wizard approach, it soon becomes second nature.

Most important of the new features is the arrival of a full backup system, with the ability to back up individual files and folders, as well as the full disk image. This works so well there's no need for additional backup tools – unlike Ghost, True Image also adds features that simple backup tools would be hard-pressed to match, such as the

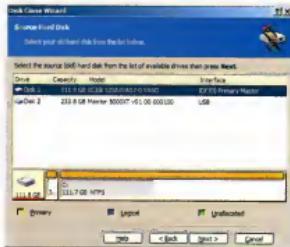


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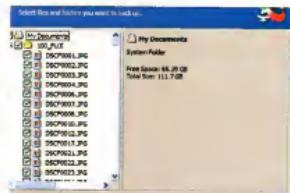
'True Image adds features that simple backup tools can't match, such as migrating an entire drive to another – partitions and all.'

data backup and recovery strategy for the home or small business, and Acronis addresses this by incorporating more holistic features.

▼ Tasks such as cloning your hard disk can be achieved with just a few simple mouse clicks.



▼ True Image allows you to back up and restore individual files and



cloning feature that allows you to migrate an entire drive to another, and both format and partition new drives.

Whereas Ghost can only perform full and incremental image backups, True Image has upped the stakes and introduced full differential support. While this results in larger images, it does ensure you'll always have all the files needed to perform a restore in one place. The Startup Recovery Manager configures your PC to boot up and restore to the most recent image without the need for a separate boot disk in the event of some catastrophic Windows failure. Once enabled, you can then press F11 during bootup, be taken into the application and restore an image from any local or network location in a matter of minutes.

Data verification is well supported, both after creating an image and before restoring one. Images can be saved to just about any media, including both USB and FireWire drives, a network and writeable CD or DVDs. There is no built-in DVD packet-writing capability though, and it only officially supports Roxio and Nero software. We didn't find this a problem, as most UDF DVD packet-writing software worked in our tests.

True Image offers comprehensive OS support, covering most workstation versions of Windows from 95 upwards and non-Windows environments such as Linux and Novell NetWare. Unfortunately, coverage doesn't run to supporting remote installation or central management. True Image 9 is strictly an individual product and you'll need a corporate

workstation version of True Image 8 for that, and you need server versions of True Image 8 (or Ghost 10) to get support for dynamic disks.

There are other potential areas of irritation, particularly in archive management. Whereas Norton will list and automatically delete old backups based upon your parameters, True Image requires manual deletion. Also, the 'locate by filename' approach can be tiresome when dealing with multiple daily archives.

Archive security isn't perfect either. Compared to Ghost's level of encryption, basic password protection just doesn't cut it. The resizable Acronis Secure Zone is restricted to storing images within a hidden partition on the source drive. This can't be accessed by normal user activity, should be safe from most viruses and, in combination with the Startup Recovery Manager, provides a handy system-restore option. It isn't much use if the drive itself suffers a catastrophic failure, so for serious backup strategy, external media is preferred.

Nonetheless, while Ghost 10's more focused, friendlier interface and tighter security make it a reasonable choice, Acronis True Image 9 beats it in every other area. As such, it's our disk-imaging application of choice.

Davey Winder

REQUIREMENTS

Windows 95 onwards.

LABS VERDICT

It doesn't support advanced encryption methods, but True Image 9 has everything else that a complete backup and data-recovery product requires.

Ease of use



Features & Design



Value



OVERALL



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Sounds best with



Ghost in the machine

Symantec Norton Ghost 10

PRICE: \$104 UPGRADE: N/A

SUPPLIER: www.advancesoftware.com.au WEB: www.symantec.com

Imaging your hard disk regularly provides a lifeline in just about any PC disaster. Whether you've fallen victim to virulent adware, Windows has become mysteriously corrupted, or you simply want to try out some unknown shareware, restoring an image is almost as good as travelling back in time. But like all backup jobs, if it isn't quick and easy, you'll be less inclined to do it. There's surprisingly little competition in the consumer disk-imaging area either, with Norton Ghost and Acronis True Image 9 (see opposite) being the principle contenders.

Symantec has completely changed the user interface of Ghost 10, with a new task-driven look and feel to simplify backup and restoration. Gone is the extensive use of wizards, although the slightly strange reason given for this is that it 'reduces complexity'. There's much to be said for the task-driven approach, though.

We particularly like the ability to set event-triggered recovery points when a new application is being installed, data is added exceeding a specified size, or a new user is logging on. We also appreciate the simplified schedule editor, which makes recovery-point scheduling a one-click process. There's an elegant slider-driven way of controlling the amount of CPU time that's used too, which can also be altered on-the-fly during a backup. True Image sticks with the traditional slow, medium and fast options, which feel a little dated by contrast.

Ghost 10 focuses on automation, with its

▼ Ghost keeps you fully informed throughout backups and restores.



▼ Triggering support is superb and just one example of Ghost 10's comprehensive automation.

hands-off approach evident throughout the application. Take the automatic monitoring of recovery point storage space, for example, deleting or archiving old recovery point data as per your configuration choices. Then there's the 'best-practice media detection' feature that monitors storage devices attached to the PC and determines which should be backed up, as well as flagging those that offer optimal backup storage capabilities – external drives will be chosen in preference to a second internal drive.

Common sense also rises to the fore when it comes to archive security, with Ghost 10 supporting 128-, 192- and 256-bit AES encryption. Don't be fooled into thinking that this is overkill: external drives are all too easy to steal, and there's no such thing as 'too secure' when someone has unlimited time to go through your data.

Backwards compatibility with version 8 and 9 format images is welcome, as is support for legacy PowerQuest Drive Image files. Unlike True Image, you can also back up to CD and DVD without the

'Symantec has completely changed the user interface of Ghost 10, with a new task-driven look and feel.'

need for additional software, use Iomega Zip and Jaz and, at long last, both USB and FireWire drives are properly supported. There's also full integration with Maxtor's One Touch system used on many of its external drives. As with True Image, there's even the ability to mount backup images as drives for easy data exploration.

Compared to True Image though, overall performance begins to look a little dated, and Ghost 10 soon falls behind. A 10GB partition of mixed data took 25 minutes to produce a 7GB image – three minutes faster than True Image but a substantial 1.5GB larger. For restoration, Acronis took 24 minutes, against Ghost's 38 minutes.

We also ran into trouble with our first image-restore test, because our external drive was assigned letter Z, the same letter used by the recovery CD for ms-ramdrive, causing a conflict. This isn't mentioned in the documentation or in Symantec's online support knowledge base, but was a common gripe in online forums.

The recovery CD is slow to boot too, taking three minutes in our tests, compared to just 30 seconds for the True Image equivalent. It won't let you create an image while using it either. This prevents the recovery of data not previously backed up from a crashed partition. True Image has no such limitations. You could achieve this by using the DOS-based Ghost 2003 CD that's included in the box, because Ghost 10 only supports Windows



▲ Simplicity is the key for Ghost 10, with task-driven interfaces for both backup and restore.

2000 and XP, but that's a clumsy solution.

The biggest flaw that holds Ghost 10 back is it hasn't followed True Image by enabling the backup of individual files and folders, and thus isn't a true all-in-one backup tool. Instead, it's a complete image or nothing – apart from incremental backups, that is. Even here though, it falls behind Acronis by not having an option for differential backups. The price difference is the final nail in the coffin with Ghost 10 coming in at almost \$40 more than Acronis.

Moreover, for sheer number of features, flexibility and real-world performance, Ghost 10 fails to compete with True Image 9. As such, unless ease of use is paramount, we can't recommend it.

Davey Winder

REQUIREMENTS

Windows 2000 Pro SP 4, XP

LABS VERDICT

Easy to use with good automation features, but it's slow compared to True Image 9 and images consume too much space.

Ease of use



Features & Design



Value



OVERALL

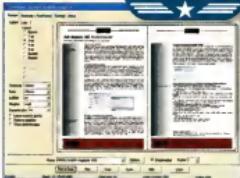


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Davey Winder reviews five essential print management tools.

FinePrint

PRICE: US\$50 **DOWNLOAD FROM:** www.fineprint.com
DOWNLOAD SIZE: 2.9MB



FinePrint is so good it begs a printer manufacturer to snap it up and use it as the front end of their driver. It does just about all that you could ever want from a print utility – a print preview with editing capabilities to enable page deletion and blank page additions, the ability to superimpose watermarks automatically, and it can also create an electronic letterhead that's always printed atop your letters. Then there's the ink saver that enables you to print multiple pages on one sheet – up to eight – and all legibly too. There's also a booklet mode, which does the necessary collation and orientation work for you. It can handle duplex printing with ease, combine small print jobs into one big one to save paper, and there's even automatic print scaling. If we could give it more than six stars, we would.

OVERALL



InkSaver 2

PRICE: US\$35 **DOWNLOAD FROM:** www.inksaver.com
DOWNLOAD SIZE: 4.1MB

As you can probably guess by the unimaginative name, InkSaver attempts to reduce the amount of ink used by inkjet printers. Normally when you print in draft mode, printers simply switch to a lower resolution, but InkSaver actually reduces the ink used and not the resolution. Although claims of 75 percent reduction sound a little optimistic to us, we believe that 25 percent savings without sacrificing either print quality or speed are certainly achievable. A sample page showing the various reductions for your printer in action is helpful in getting the right quality-versus-savings balance. You should certainly give the demo a try, especially if you have the pleasure of working with an older or particularly greedy printer.

OVERALL



Business Card Designer Plus

PRICE: US\$25 **DOWNLOAD FROM:** www.camdevelopment.com
DOWNLOAD SIZE: 3.1MB

Business Card Designer Plus offers the option to both design and print your cards – assuming you're happy to buy professional business card stock from the likes of Avery. There's an option to save in various formats to take the design to a 'proper printer' if you want, but that does rather negate the point. The actual design element is easy, either using the numerous templates or starting from scratch. We found the latter produced the best results, as the templates were irrelevant or tacky. The value proposition is weakened by the likes of www.vistaprint.com, which produces glossy cards for a few pounds, but it's great for trying out ideas.

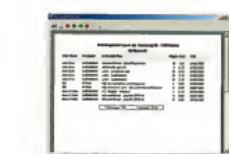
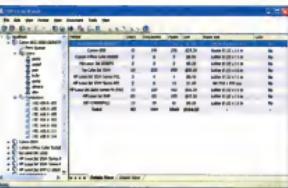
OVERALL

O&K Print Watch

PRICE: From US\$100 **DOWNLOAD FROM:** www.prnwatch.com
DOWNLOAD SIZE: 5.5MB

O&K is a print-auditing tool at heart, enabling the administrator to specify costs per document printed. You can sit back while it gets on with the job of calculating your print costs, allowing for variables such as paper size and print properties. But it also goes much further than that, enabling direct manipulation of the print queue and tracking of multiple printers simultaneously. The fact that it also maintains its own database of historical statistical data for each user, each printer and each computer is a bonus. We liked the fact that, unlike many cheaper utilities that claim to do the same, O&K knows the difference between 20 copies of a five-page document and a single print. For managing print priorities and print budgeting between shared users, it's hard to fault.

OVERALL



Print Inspector

PRICE: US\$99 **DOWNLOAD FROM:** www.softperfect.com
DOWNLOAD SIZE: 1.7MB

Similar in many ways to O&K, this is another management and auditing tool. However, Print Inspector's main asset is the power and flexibility of its built-in reporting tool. From the historical data it stores within its own database, it can keep it simple with just a list of print jobs, or go into more depth with regard to individual documents, printers, computers or users. Since this data can be exported to CSV format, it can also be plugged straight into Microsoft Excel for your own analytical exercises. O&K has the edge in terms of graphical output, though, and can therefore produce much more visually attractive reports. For this reason and no other, we prefer O&K, but it's worth trying both to see which suits you best.

OVERALL



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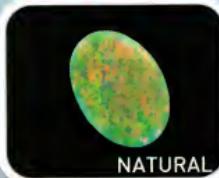
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PRICE: \$12,876 DELIVERY: Free

SUPPLIER: HP 13 22 47 INTERNET: www.hp.com.au

In a world where the raw computing power of the average desktop PC exceeds the supercomputers of the recent past, it's pertinent to ask whether machines labelled as workstations are worthwhile or simply a way for manufacturers to overcharge for hardware essentially identical to a standard PC. HP would like you to think otherwise.

The internals of the xw9300 Workstation are more heavily engineered than a regular PC and the casing is moderately deep at 515mm. The build certainly isn't lightweight; take off the chassis side panel to access the machine and it feels like it would stop a bullet.

The specification of our review machine was a pair of single-core Opteron 252 processors running in a HP-branded NVIDIA nForce Pro motherboard, 4GB of ECC RAM occupying four of the eight DIMM sockets, plus a single Maxtor Atlas 15K II SCSI hard disk spinning at 15,000rpm -- twice the spindle speed of a standard fast desktop SATA disk and 50 per cent faster than even Western Digital's Raptor 10K SATA drives. Graphics come courtesy of dual NVIDIA Quadro FX 3400 workstation graphics in an SLI setup. With 256MB of RAM per card and 28.48GB/sec memory bandwidth, there's plenty of grunt on offer.

Inside, all chips on the motherboard are passively cooled, with the exception of the two Opteron CPUs; these both have active copper heatsinks and share a single air duct to bring cooler air in from the front of the machine rather than recycling warm air from the internals. This is a sound idea, since the two Quadro cards -- both with their own standard active NVIDIA heatsinks -- become very hot, to the extent that you can easily feel their radiated heat when you take the cover off the machine. HP makes a lot of its intelligent fan-speed system controlling the rear 120mm and front 90mm case fans, but unfortunately it

▼ Everything inside the xw9300 is designed for easy maintenance.



isn't particularly clever. In use, fan speed jumps in coarse leaps, which can lead to a constant yo-yo change in sound level and pitch that we found far more annoying than a loud machine at a constant level.

Internals are tool-less, with expansion cards secured in the backplane by a single securing bar held by two easily removed clips. It's the same story with the hard disk, mounted horizontally on rails at right angles so it will slide out simply by pushing the side clips together and giving it a tug. It falls short of hot-swap capability, but replacing a drive will take only about ten minutes. Three more quick-release bays stand ready to accept drives, but that's the limit of drive expansion potential, save for a free 5.25in front panel bay for an extra optical drive. As it is, a single Philips dual-layer DVD writer occupies one front bay and a floppy drive the second. A heavyweight Delta 750W power supply completes the picture, although the system stops short of server-style power supply redundancy.

There's plenty of scope for storage expansion beyond drive bays: four unused SATA II ports give full RAID0, 1 and 0+1 capability, and an unused integrated Ultra320 SCSI port is joined by an LSI Logic 53C1030 Ultra320 PCI-X card, giving one extra internal port plus an external LVD/SE connector. This takes up the only PCI-X/133 slot, with two 100MHz PCI-X slots remaining. A standard PCI slot sits between the Quadro cards, so is effectively unusable.

HP answers questions of the relevance of the 'workstation' label with consummate ease. With an overall application benchmark score of 1.28, it's faster than any desktop machine we've tested; the prime factors in that score are the 252 Opterons -- the highest-specification, single-core Opteron available -- and the mass-storage subsystem. The Atlas 15K drive shows that SCSI isn't dead when performance is the top priority. And when it comes to graphics performance, the xw9300 is just as impressive, completing our 3ds Max 100-frame 100,000+ polygon animation preview test -- a separate test from our standard benchmark suite -- in an incredible eight seconds under DirectX, a speed of half real-time. It's a good indicator of performance when a machine completes a benchmark so fast you realise you're about to need a new one.

The final seal of the HP's worthiness is that it's specifically dual-core ready, so if more raw computing power is required there's a clear and simple upgrade path that will give you four cores and at least a 50 per cent speed boost for multithreaded applications. And when you



▲ A superb machine that's fully configurable to your needs.

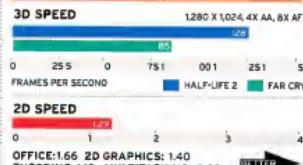
look at the price in comparison to some of the excessively bejewelled overclocked systems around, it isn't completely ludicrous. The xw9300 is a superb machine. To configure it to your needs, go to www.hp.com.au.

David Fearn

SPECIFICATIONS

Dual 2.6GHz AMD Opteron 252; 4GB ECC PC3200 RAM; HP motherboard: 1466B Maxtor Atlas 15K II SCSI hard disk; dual 256MB NVIDIA Quadro FX 3400 SLI graphics; Philips DVD B631 dual-layer DVD writer; integrated NVIDIA Gigabit Ethernet; Windows XP Professional SP 2; 3yr on-site warranty. Part code: N/A.

RESULTS



LABS VERDICT

Expensive, but the money goes into spectacular performance. The fastest desktop PC we've yet seen and a match for any high-end application; the only drawback is the

Performance



Features & Design



Value



OVERALL



A small unit for small business

HP dx5150 Small Form Factor

PRICE: \$1160 DELIVERY: Free

SUPPLIER: HP 13 22 47 WEB: www.hp.com.au



When we looked at HP's current generation of Intel-based business PCs, the dc7600 series (September 2005, page 39), we praised their versatility and ingenious design. Based on Intel's 945G Express chipset, the dc7600 series utilises the silicon giant's Stable Image Platform (SIP). This not only standardises the process of mass rollout with a single disk image across the range, but also provides a level of guarantee for future support.

As a range, the dx5150 is based around an ATI chipset and Socket 939 AMD processors. Like the dc7600, there's a number of specifications available – in this case, everything from cheaper single-core CPUs up to a dual-core Athlon 64 X2 3800+. Although there's no specific equivalent of SIP here, you can still use a single disk image across the dx5150 range, as the chipset is common across all models. HP is only promising the platform will be 'stable' until April 2006 though.

The dx5150 Small Form Factor sits in the middle of the range, and our review specification

'As a range, the dx5150 is based around an ATI chipset and Socket 939 AMD processors.'

included an AMD Athlon 3200+ processor and 512MB of RAM, achieving a score of 0.86 in our benchmarks. It's a fast, everyday PC though, as its score of 1.15 in our Office tests show. That's 15 percent faster than our reference 3.2GHz Pentium D 840 PC. Those looking for after-hours entertainment will be disappointed, as the integrated ATI Radeon Xpress 200 GPU lacks the muscle for current gaming titles, but it's sufficient to have these machines running Windows Vista

▼ The part of the dx5150's chassis that holds the optical and hard disk drives swings up to reveal a tidy, easy-to-access interior.



when the time comes.

The hard disk is an 80GB Seagate Barracuda model – restrictive compared to modern consumer PCs, but still more than enough for most office uses. If it's not, there's a spare 3.5in bay and a Serial ATA port on the motherboard for future expansion. The review specification also offers a DVD-ROM/CD-RW combo drive rather than a DVD writer, so other backup methods would be preferable for mission-critical data.

You won't have problems if you need to add external peripherals, as you'll find a generous eight USB ports, two of which are on the front panel along with audio input/outputs. The mouse and keyboard are connected via the PS/2 ports, thus maximising the

is based around an ATI chipset and Socket 939 AMD processors.'

number of peripherals you can attach.

The keyboard itself is worthy of note too, simply because of how quiet it is. Unlike many others, there's no rattling or clicking in evidence, so you can tap away in a quiet environment with impunity. One minor objection is the mouse though, which is a ball model rather than a more robust optical one.

But we have no complaints elsewhere. We're used to budget PCs – particularly when they're aggressively priced – looking and feeling cheap, but the dx5150 bears all of HP's customary build quality and design features. Accessing the internals is easy, with just a slide-off tool-less lid in the way. You can then swing up the chassis containing the optical drive and hard disk, giving access to four DIMM sockets (two of which are free). There's also a PCI Express 16x graphics slot, one PCI Express 1x slot and two traditional PCI slots, all of which are half height. Unlike the dc7600 Ultra Slim Desktop, which is even smaller than the dx5150, there's no option to install a full-sized PCI card horizontally.

Sensible design and routing keep the power and data cables out of the way, and a duct on top of the heatsink/fan vents heat directly out the side, meaning there's little heat build-up in the system. This has the twin advantages of increased reliability and reduced noise – the dx5150 produces a low-level hum that's too quiet to hear in most offices and barely perceptible even in a quiet room.

For businesses, the dx5150 range offers an



▲ Incredibly cheap and generously specified, the dx5150 is perfect for small business and home use.

impressively flexible set of specifications, as well as an incredibly tempting price. The downside is that ATI simply doesn't have Intel's proven track record when it comes to producing motherboard chipsets, and that will cause understandable caution over any large-scale rollout. There's also nothing to compare with Intel's comprehensive remote management features, all of which leaves Dell's noticeably more expensive OptiPlex 620 USFF on the A-List. For smaller installations though, it's a far less serious concern, especially as HP includes a three-year on-site warranty. And it isn't only businesses that will find the dx5150 an appealing proposition. It will be just as comfortable at home as in the office.

Dave Stevenson

RESULTS

2D SPEED		OVERALL				
0	1	2	3	4	5	
HOURS/MINUTES						
OFFICE: 1.15	2D GRAPHICS: 0.88					
ENCODING: 0.77	MULTITASKING: 0.64					

BETTER

SPECIFICATIONS

2GHz AMD Athlon 64 3200+; 512MB PC3200 RAM, MSI MS-7050 motherboard; 80GB Seagate Barracuda 7200.7 hard disk; Toshiba TS-H492A DVD-ROM/CD-RW combo drive; integrated ATI Radeon Xpress 200 graphics; Gigabit Ethernet; Windows XP Pro. 3yr on-site NBD warranty.

LABS VERDICT

Everything a business PC should be – quiet, cheap and well supported. It's lacking a few key features though, so is more suited to smaller offices or homes.

Performance	★★★★★
Features & Design	★★★★★
Value	★★★★★
OVERALL	★★★★★

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DOUBLE

We test five dual-core PCs based on AMD and Intel chips, with prices ranging from \$2200 to \$7500.

The benefit of a dual-core PCs is clear. – not only do you cut the processing speeds in half in certain applications, your whole system becomes much more responsive. And you needn't re-mortgage your home to buy one – this month we cover all budgets.

The cheapest system we have this month (from Aztec) costs just over two grand, but still manages to include an LCD monitor, decent speakers and a 3D graphics card. But its most expensive competitor (from Alienware) costs over \$5000 more. We cover many of the bases in between and use our scientific labs process to tell you which ones represent the best value.

Systems based on both Intel and AMD platforms are included. The latter offers more oomph, but is more expensive due to other components in their systems. We'll examine which truly offers the best bang for your buck.

Gamers will be pleased that some

manufacturers pushed the boat out on high-end graphics hardware. While all machines can play games, you'll be dropping detail settings and resolutions to play them on a system with a Geforce 6600 card, while Alienware's dual, overclocked 7800 GTX cards running in SLI will cope with anything thrown their way.

All of this month's systems give you everything you need to get up and running, including big hard disks, dual-layer DVD writers, keyboard, mouse and LCD monitors. With budget and specifications varying to a high degree everyone will find something to suit their needs.

Start by reading How We Test before moving on to the reviews and seeing who picked up the awards. There's an extensive Feature Table on page 86 and we also examine Intel's new Extreme Edition dual-core platform on page 87 and the future of CPUs on page 88.

Contributor Nick Ross

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THE FUN



How we test

Dual-core PCs require a healthy dose of real world testing and analysis. Here's how we did it.

At the end of each review, we give four star ratings. These include Performance, Features & Design, Value for Money and an Overall rating. We don't just pluck these figures out of the air – they're calculated using a complex array of benchmark results, objective scores and subjective quality ratings.

Performance

We carefully put each machine through its paces in a rigorous series of tests using real-world applications such as Word, Access, Photoshop and CorelDRAW. Furthermore, we take accuracy very seriously, and our benchmarks are designed to produce the same results to a variance of 0.5 percent. Overall, these performances give a more accurate representation of how each system will perform when it's sitting on your desk and running the applications you'll most likely use. For more information, see our benchmarking summary on page 45, or head to *December 2005, page 44*.

The 2D Performance result accounts for half this score and is relative to a score of 1 from our reference PC, a dual-core

3.2GHz Pentium D 840 system with 1GB of PC3200 RAM, a 10,000rpm Western Digital Raptor hard disk and an NVIDIA 6600 GT graphics card. A score of 0.50 represents that it's 50 percent slower than the reference PC while a score of 1.50 would show it to be 50 percent faster.

3D performance makes up the other 50 percent of the performance score. We use our pre-recorded time demos for Far Cry and Half Life 2 as benchmarks. Resolutions are set to 1280 x 1024 and 4x anti-aliasing and 8x anisotropic filtering enabled.

Features & Design

The Features & Design score is calculated using a huge array of scores given to each machine based on objective measurements, such as the motherboard's capabilities, the range of connectivity options and the hard disk capacity. We also give scores for software bundles and more importantly, points are given for the amount and type of warranty. On-site cover is highly rewarded.

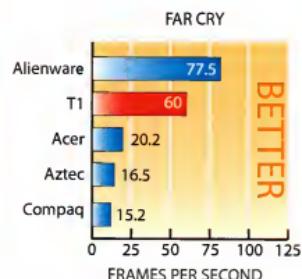
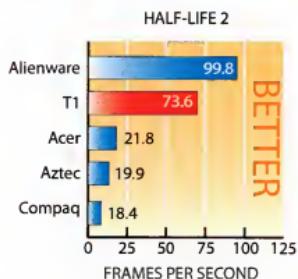
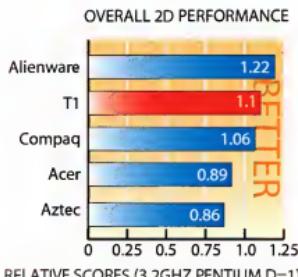
The rating also includes some subjective scores, which are decided by a panel of judges to help overcome any bias resulting from one person's taste. The subjective scores cover all those items that can't be measured objectively, such as build quality, style and LCD quality.

Value for Money

Value for Money is based on a weighted average of the individual Performance and Features & Design scores. We then factor in exactly how much each machine costs to give a bang-per-buck result.

Overall

The Overall rating is a straight average of the Performance, Features & Design and Value for Money scores.



▲ Alienware's PC is one of the best built ever.



▲ There's room for three more hard disks in Acer's small case.



▲ Compaq's system does not lend itself to upgrading.



▲ Aztec's case resembles an iPod from the front – allegedly.

An all round gem

TI AMD Power 3000

PRICE: \$3025

SUPPLIER: From \$25 to \$48

There are few readers that wouldn't want Alienware's luxury PC if price wasn't an option. But even when you discount the enormous \$4500 price discrepancy, Trinity International's system was hot on its heals at the finish line. Most surprising of all was that in several areas TI's computer was actually a bit better.

TI's AMD X2 4200+ dual-core processor was never going to beat Alienware's 4800+. Both machines sport 1GB of high-performance memory, though the twin Geil sticks in the TI machine don't have blinky LEDs on them like Alienware's Corsair. TI's combination of two 250GB WD hard disks (in a RAID0 configuration) is superior in capacity to Alienware's two 160GB drives. This all combined to achieve a respectable score of 1.10 in our 2D benchmarks – just 12 percent slower than the Aurora.

These were all plugged into an ASUS A8N-SLI Premium motherboard – a variant of our A-Listed A8N-SLI Deluxe. However,



monitor which is included immediately limits resolutions to 1280 x 1024 – too much more power would just be overkill. Alienware gets away with its SLI system because it includes a 20in LCD monitor, which steps up to a far more taxing 1600 x 1200 resolution.

The monitor itself is the very competent FP91G. While its colour reproduction won't quite cut it for top-end graphic artists, few will complain with the bright and crisp

▲ Looks good and works well.

of room in the case. Two internal 3.5in drive bays are available as are an external one and a 5.25in bay at the front. The Antec case provides a large plastic duct for channelling hot air from the CPU and graphics card directly out the back through the 120mm fan. After removing several screws with our fingers, the innards proved easily accessible. You'll find a spare PCI Express 16x slot to add a second graphics card should the current one fail limiting down the line.

It's not the quietest system but the fan noise is low and certainly not distracting.

Connectivity options are good. At the front the silvered-plastic flap moves up to reveal two USB 2 ports, two audio jacks and a FireWire port. Above this the (lockable) front door hides the optical and floppy drives. At the back is everything most people need, with six USB 2 ports, FireWire, optical and coaxial S/PDIF outs as well as legacy Parallel, Serial and Game ports.

The system as a whole looks great and we can't really find a weak spot. The two year RTB warranty could be better but even this is twice that of Alienware. The system itself looks sleek and black and would grace any home.

The best news of all is that there's barely a premium to be paid for all the extras (when compared to Compaq and Acer). We're very happy to recommend it.

'The system as a whole looks great and we can't find a weak spot.'

as we were going to press TI informed us that it will actually include the even newer A8N32-SLI Deluxe variant to end users and we didn't complain.

The TI also held its own in the 3D tests as well. By including a Leadtek 7800 GT, this system will play all but the very latest games (like FEAR) at their full resolutions at 1280 x 1024. Scores of 60fps in Far Cry and 73.6fps in Half-Life 2 show this will be able to handle games for some time to come. This is especially sensible as the 19in LCD

display. We also saw minimal lag with the 12ms response time. While it can't compete with its deluxe 20in sibling seen on the Aurora, we once again remind you of the price difference.

We were also most impressed with TI's other peripherals. The Logitech MX3000 keyboard and laser mouse set were by far the best on show. The keyboard is very well featured, with its multimedia and shortcut buttons, while not being oversized. It remains comfortable and responsive to type on and is wireless. The mouse is ergonomic – though built for right-handers. It feels comfortable and is very accurate thanks to its laser technology, despite also being wireless. Frankly, they put Alienware's mid-range Microsoft offerings to shame.

TI also thought to add speakers. While Creative's 2500 2.1 offerings won't set the world alight, they're the best on show and are a nice inclusion for people wanting a fully-featured system to work out of the box. A second optical drive in the form of a DVD-ROM. The burner itself is excellent and offers some of the highest speeds available as well as including support for DVD-RAM, dual-layer DVD+R9 discs as well as DVD-R9. Only LightScribe is missing (as seen on Compaq's competitor).

Should you wish to upgrade there's plenty



▲ The large plastic air duct, which enhances heat dissipation, has been removed for this picture.

LABS VERDICT

TI's system offers great all round performance and a whole host of features for significantly less than the Alienware and only a minor premium compared to everything else.

Performance	★★★★★
Features & Design	★★★★★
Value	★★★★★

OVERALL

★★★★★

Acer Aspire E500

PRICE: \$2999

DELIVERY: Free

The E500's case is refreshingly small at only 360mm in height and some thought has gone into the design. The top two drive bays (one of which houses a decent dual-layer DVD writer) are both well hidden.

Despite the small chassis there's still room for an additional three hard disks and an external 3.5in bay. The other external 3.5in bay has a media card reader which also sports a mini FireWire port. Next to these are two USB 2 ports and two audio jacks – all of which can be covered up by a large sliding plastic flap when not in use. It's practical and stylish, although what the rubber pad is for on the top of the case is anyone's guess. A drinks coaster?

If you look at Acer's online shop you'll see that the Aspire E500 comes in several configurable flavours from various base models. However, we have some issues with these. The E500 is supposed to work well with Media Center 2005 but our configuration doesn't allow an upgrade from Windows XP Home. If you choose an MCE base model with an otherwise identical hardware specification you'll find the price jumps up to over \$3500 – outrageous for a \$50 software upgrade.

Consequently you're stuck with Acer's own multimedia software – which isn't terrible but is far more clunky than the luxury of MCE. But a TV tuner with remote is included, offering either

analogue or digital.

We initially liked the 19in widescreen monitor – the 1440 x 900 resolution benefits your Desktop. However, it's a low-end model with no DVI and pixel jitter was noticeable on mesh backgrounds. Colour reproduction was modest as were viewing angles and lag. We'd like better for this money. The wireless optical keyboard and mouse are low-end Logitech offerings.

In terms of grunt it offered modest performance. The Pentium D 840 processor and 1GB of RAM managed a reasonable score of 0.89 in our 2D benchmarks. In 3D the X700 battled through Far Cry and Half-Life 2 scoring 20.2 and 21.8fps respectively – ie it plays games, but not well. Unfortunately, the graphics card fan's annoying whine spoiled the near silent system.

Still the 250GB hard disk capacity isn't bad and the one year onsite warranty is decent (though we recommend boosting it to three years for \$228). Just note you must be within 80km of a service centre. We also like the inclusion of Works Suite



2005 and Encyclopaedia Britannica software.

However, if you're spending this much money you're right to expect more. In the TI's company it's a mediocre PC that's overpriced. If it was geared around MCE then it might be different.

LABS VERDICT

A disappointment from Acer – it could have been much better with a little more effort.

Performance



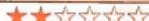
Features & Design



Value



OVERALL



Alienware Aurora 7500

PRICE: \$7,548

DELIVERY: \$99

The monolithic nature of Alienware's box made us briefly wonder whether a landmark in human evolution had arrived when it landed in our office. Once de-boxed we saw why – this monster is worth protecting. The full-tower case has been around for a while now but it never ceases to impress – a cross between a spaceship, tombstone and old Chevy pickup.

Opening it up, you're greeted with one of the best-made PCs around. The cabling is supremely tidy and even the noise insulation foam sports Alienware detailing. The speedy Corsair RAM sticks have blinking LEDs on them and the PCI cards all have supports to prevent them dislodging.

The specs are all top-end with an Athlon X2 4800+, 1GB of performance RAM and two 160GB hard disks in RAID0. Not surprisingly it flew through our benchmarks scoring a whopping 1.22. The Aurora also uses two 'rare' eVGA overclocked 7800 GTX graphics cards, with additional passive cooling, running in SLI. It waltzed through our game benchmarks scoring 99.8fps in Half-Life 2 and 77.5fps in Far Cry. This isn't overkill as Alienware use a 20in top-end BenQ LCD monitor (the supplied model comes with Alienware detailing). It needs this grunt to play the latest games at the native 1600 x 1200 resolution.

The monitor also sports Composite and S-Video inputs and a three port USB hub. The stand pivots and swivels to a large extent and the display performance was the best on show. However, the other peripherals were a let-down. The Microsoft keyboard and optical mouse are disappointingly mid-range offerings. Both are sensibly wired for improved responsiveness for gamers though. No speakers are included and there is only one optical drive though it covers dual-layer DVD+R9 and DVD-RAM formats. At this price we'd like a second.

Four hard disk bays are spare along with three 5.25in and a 3.5in external bay. A PCI slot is available – the other is taken up with an X-Fi sound card, though the two 1x slots will be tricky to use with the SLI set up.

With the side on there's not too much noise but you'll certainly notice it in your home or office. But this machine drawing attention to its glorious self is no bad thing.

Yet we can't quite recommend it. For this much money there's too much missing. The one year RTB warranty is decidedly stingy and no speakers are included at all. The peripherals



should all be top notch and they aren't. TI's system simply isn't far enough behind to make the four and a half grand difference worth paying. If money is no object or you're a top gamer, this is for you.

LABS VERDICT

Fantastically fast and well-built, but it's overpriced and some features are mediocre.

Performance



Features & Design



Value



OVERALL



Aztec Aquadyne

PRICE: \$2200

DELIVERY: \$45 Sydney (Australia Post elsewhere)

We weren't overly impressed with the Aquadyne's case when we first saw it. The oversized-buttons seemed daft until we realised that they were supposed to resemble those of an iPod (the case is called the 'a-Pod'). We'll let you decide whether it works or not. There are certainly some good degrees of functionality about it with a media card reader being hidden behind one flap and USB and audio jacks hidden behind another.

In truth though, the most eye-catching thing about this system is the LCD monitor, the AG Neovo E-17. Some people can't see past the reflective 'optical' coating of the screen, but we really like the way it enhances the colours in games, picture and movies. Unfortunately though, it's a bottom-of-the-range version with only an analogue D-Sub input. It shows toes as we occasionally noticed pixel jitter on uniform areas of the screen like Office windows and the Desktop. Its generally better for multimedia applications though the 20ms response causes occasional lag. The built-in speakers aren't bad for a monitor but you'll be using the decent Creative 2500 2.1 set instead.

Still, we were happy to see Logitech's LX3000 wireless optical keyboard and mouse set included – the second best on show behind TI's Logitech

'laser' equivalents.

Inside Aztec has chosen the Intel path, with a 2.8GHz Pentium D 820 being flanked by 1GB of memory. Not surprisingly for the price, there's only one hard disk though we were disappointed it only had 160GB of storage. This all combined to generate a benchmark score of 0.86 – only 14 percent slower than our reference PC but still the slowest on show. We can't see many people grumbling with general speed though, unless they want good 3D performance. The GeForce 6600 chip struggled in our tests scoring 19.9 and 16.5 in Half-Life 2 and Far Cry respectively – you'll have to drop detail settings to get these games playable and it will struggle with the latest releases.

But non-gamers won't mind. At least Aztec has included a speedy DVD writer which is compatible with dual-layer DVD+R9 discs. There's plenty of room for expandability though, with space for four more hard disks alongside an external 3.5in and three 5.25in drive bays.

However, despite the price you get a great deal



more for your money with the TI system which covers every base. But if gaming, style and quality peripherals don't bother you the Aztec could prove tempting – especially if you pay the extra \$120 which moves a poor one year RTB warranty up to a superb 3 year onsite offering.

LABS VERDICT

If you're not too fussed about gaming and just want a cheap dual-core PC, it's worth a look.

Performance
Features & Design
Value



OVERALL



Compaq Presario SR1699AN

PRICE: \$3199

DELIVERY: Free

The Compaq finished in the middle of the pack having failed to distinguish itself in most areas. The case itself is actually quite stylish if you can see beyond the plastic-ness. The gloss and matte front panel is also rather functional sporting three audio jacks a FireWire and two USB 2 ports along with a media card reader. There's only one optical drive though, which isn't the fastest but it supports dual-layer DVD+R9 writing and the LightScribe ability more than makes up for most deficiencies.

There's space to add another for disc to disc copying, though little else – there's only room inside for one more hard disk if the 200GB offering starts to feel restrictive. HP has made some curious choices inside. While we welcome the addition of a 802.11a/b/g WLAN card and a modem, all four memory slots are filled with 2GB of RAM. This feels rather excessive – the money would have been better spent on upgrading the graphics card and processor.

Indeed, the graphics card is a rather poor Radeon 6600. This managed scores of 18.4 and 15.2fps in our Half-Life 2 and Far Cry tests respectively. You'll need to drop the detail settings down to play these games and you can forget about the latest releases. The CPU is an AMD X2 3800+ which helped to generate an impressive

score of 1.06 in our tests.

One of the most notable features is the quietness. It's near silent. This, along with the small form factor and 2D grunt will instantly make it attractive to non-gaming folk who just want a powerful PC that's not too obtrusive. Such people will also like the 19in HP f1905 monitor. This offers a crisp and bright desktop and good colour reproduction. The 16ms response time did cause occasional lag but it was nothing too distracting. Watching films or looking at photos was very pleasant. The monitor also comes with separate stereo speakers which offer impressive punch and good treble.

The keyboard and mouse are a touch mediocre. Both feel plasticky, but the mouse is responsive and comfortable to use. The keyboard is usable but not ideal for people who type a great deal.

We liked the fact that the system came with Microsoft Works Suite 2005 and Norton Internet Security 2005. The warranty is three years, though only the first is onsite and the last year is labour only – better than most on show.



Ultimately though, beyond 2D power and silence, the Compaq fails to distinguish itself this month. But the real nail in the coffin is the fact that TI's system is better at everything and costs even less.

LABS VERDICT

Some nice touches but TI's system is cheaper and better.

Performance
Features & Design
Value



OVERALL





	Acer Aspire E500	Alienware Aurora T500	Aztec Aquadyne	Compaq Presario SR1699PA	TI AMD Power 3C00 (WINNER)
OVERALL RATING	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Manufacturer's specific order code	AS.E5T9.D9DGE	Aurora T500	Aztec Aquadyne	EG271AA	AMD Power 3000
Price (11 inc GST)	\$299	\$7548	\$2200	\$399	\$3025
Price of delivery (inc GST)	Free	\$99	\$45 Sydney / Aus. Post elsewhere	Free	From \$25 to \$48
Manufacturer's phone number	1800 366 567	1800 005 003	02 9792 7085	1800 304 889	02 9437 5437
Manufacturer's website	www.acer.com.au	www.alienwaresystems.com.au	www.aztectech.com.au	www.hp.com.au	www.ticomputers.com.au
Warranty (1)	1yr onsite (3 yrs onsite for \$228)	1yr RTB	1yr RTB (3 yrs onsite for \$120)	3yrs (1yr onsite, 1yr RTB, 1yr RTB labour only)	2yrs RTB
PROCESSOR					
Processor type	Intel Pentium D 840	AMD Athlon 64 X2 4800+	Intel Pentium D 820	AMD Athlon 64 X2 3800+	AMD Athlon 64 X2 4200+
Front side bus frequency	3.2GHz	2.4GHz	2.8GHz	2GHz	2.2GHz
Socket type	Socket 775	Socket 593	Socket 775	Socket 939	Socket 939
Motherboard make and model	Acer proprietary	Asus ABN-SLI Deluxe	Asus P5L02	MSI Amethyst M-MS7184	Asus ABN-SLI Premium
Chipset (north bridge)	Intel 945P	Nvidia nForce4 SLI	Intel 945P	ATI Radeon Xpress 200	Nvidia nForce4 SLI
PCI free/total	0/2 PCI; 0/1 PCI-E 16x; 1/1 PCI-E 1x	2/3 PCI; 0/2 PCI-E 16x; 2/2 PCI-E 1x	3/3 PCI; 0/1 PCI-E 16x; 3/3 PCI-E 1x	1/3 PCI; 0/1 PCI-E 16x	3/3 PCI; 0/2 PCI-E 16x; 1/1 PCI-E 4x
Drive connectors	4 x Serial ATA/150; 2 x Ultra ATA/133	4 x Serial ATA/100; 4 x Serial ATA/150; 2 x Ultra ATA/133	4 x Serial ATA/100; 2 x Ultra ATA/133	2 x Serial ATA/150; 2 x Ultra ATA/133	4 x Serial ATA/100; 4 x Serial ATA/150; 2 x Ultra ATA/133
MOTHERBOARDS					
Main Integrated controllers	VIA (FireWire); ULi M1573 (RAID); Marvell 88E8001 (Gigabit Ethernet)	NVIDIA nForce4 (RAID); Gigabit Ethernet; SI 3139 (RAID); Texas Instruments (EEDC94 (FireWire); Marvell 88E8110 (Gigabit Ethernet))	Marvell 88E8053 (Gigabit Ethernet); Intel ICH7R (RAID); Ethernet; VIA (FireWire)	ATI SB400 (RAID); Realtek Ethernet; SI 3139 (RAID); Ethernet; VIA (FireWire)	NVIDIA nForce4 (RAID); Gigabit Ethernet; SI 3139 (RAID); Texas Instruments (EEDC94 (FireWire); Marvell 88E8110 (Gigabit Ethernet))
RAM fitted	1GB PC2-4200	2GB PC2-5300X1 Corsair Pro	1GB PC2-4200	2GB PC3200	1GB Geil Performance PC3200
MEMORY					
Max RAM supported	2GB	4GB	4GB	4GB	4GB
Max RAM in current config	1GB	4GB	3GB	2GB	3GB
Memory sockets free/total	0/2	2/4	2/4	0/4	2/4
Make and model	ATI Radeon X700	2 x NVIDIA GeForce 7800 GTX R1 in SLI	Leatertek WinFast NVIDIA GeForce 6600	NVIDIA GeForce 6600	Leadtek WinFast NVIDIA GeForce 7800 GT
Chipset	ATI Radeon X700	NVIDIA GeForce 7800 GTX	NVIDIA GeForce 6600	NVIDIA GeForce 6600	GeForce 7800 GT
RAM fitted	256MB	2 x 256MB	256MB	256MB	256MB
Outputs/Inputs	DVI; D-Sub; component; S-Video/ Composite; S-Video/ Composite; S-Video	2 x DVI; component; composite; S- Video/ Composite; S-Video	DVI; D-Sub; component; S-Video/ Composite; S-Video	2 x DVI; D-Sub; component; S-Video/ Composite; S-Video	2 x DVI; S-Video; composite; component; S-Video; composite
Make and model	Seagate Barracuda 7200.8	2 x Seagate Barracuda 7200.9	Seagate Barracuda 7200.9	Seagate Barracuda 7200.8	2 x 250GB WD 250D
RAID	×	RAID0	×	RAID0	RAID0
HARD DISK					
Interface	SATA	SATA	SATA	SATA	SATA
Nominal capacity	250GB	320GB	160GB	200GB	500GB
Formatted capacity	229GB	290GB	149GB	180GB	465GB
Memory buffer	8MB	2 x 16MB	8MB	8MB	8MB
Speed (rpm)	7200	7200	7200	7200	7200
DRIVES					
Drive 1	DVD writer; LG GSA-4164B (6x) DVD+/-R 8x DVD+/-RW 6x DVD+/-R, 16x DVD+/-RW, 6x DVD-RW, 4x DVD-R, 16x DVD-RAM, 40x CD-R, 32x CD-RW, 40x CD-RW)	DVD writer; LG GSA-4163B (6x) DVD+/-R 8x DVD+/-RW, 4x DVD+/-R, 16x DVD+/-RW, 6x DVD-RW, 4x DVD-R, 16x DVD-RAM, 40x CD-R, 24x CD-RW, 40x CD-RW)	DVD writer; Asus DRW-1620P (6x) DVD+/-R, 8x DVD+/-RW, 4x DVD+/-R, 16x DVD+/-RW, 4x DVD-RW, 4x DVD-R, 16x DVD-RAM, 40x CD-R, 24x CD-RW, 40x CD-RW)	DVD writer; VIVID 7400 (6x) DVD+/-R, 4x DVD+/-RW, 2x DVD+/-R, 8x DVD+/-RW, 16x DVD+/-RW, 4x DVD-RW, 4x DVD-R, 16x DVD-RAM, 40x CD-R, 24x CD-RW, 40x CD-RW)	DVD writer; LG GSA-4164B (6x) DVD+/-R, 8x DVD+/-RW, 4x DVD+/-R, 16x DVD+/-RW, 6x DVD+/-RW, 4x DVD-RW, 4x DVD-R, 16x DVD-RAM, 40x CD-R, 24x CD-RW, 40x CD-RW)
Drive 2	xD	x	x	x	x
Floppy drive / card reader	✓/ CF, SD/MMC, MS, SM, xD; Mini FireWire	✓/x	✓/ CF, SD/MMC, MS, SM, xD; USB 2	✓/ CF, SD/MMC, MS, SM, xD; USB 2	✓/x
Make and model	Acer AL3194W	BenQ FP209i by Alenware	AG Neovo E17	HP P1005	BenQ FP219G
Display type	TFT	TFT	TFT	TFT	TFT
Screen diagonal (in)	19	20	17	19	19
Native resolution	1440 x 900	1600 x 1280	1280 x 1024	1280 x 1024	1280 x 1024
Response time (ms)	8	16	20	16	12
Inputs	D-Sub	DVI; D-Sub; composite; S-Video; 3 port USB 2 hub	D-Sub; audio	D-SUB; DVI-I	D-SUB; DVI-I
DVI cable supplied	NA	✓	NA	✓	✓
Sound card (location)	Realtek ALC880 eight-channel (Integrated)	Creative X-Fi XtremeMusic (PCI)	Realtek ALC882 eight-channel audio (Integrated)	Realtek ALC658 six-channel audio (Integrated)	Realtek ALC880 eight-channel audio (Integrated)
Speakers (satellites/subwoofer)	Acer stereo speakers (2.0)	Creative Inspire 2500 (2.1)	Acer stereo speakers (2.0)	Hifi stereo speakers (2.0)	Creative Inspire 2500 (2.1)
Modem type (speed, location)	SoftV92 DataFax Modem (56kb; PCI)	✓	✓	Agere Systems V90 (56kb; PCI)	✓
Other (location)	✓	✓	✓	Liteon BO21Ba/b/g WLAN (PCI)	✓
Case type	Acer microtower	Afterwave Full-Tower	XTYLINE aSUS Mid Tower	HP Micro Tower	Aztec Sonata II Mid Tower
Dimensions (w x d x h, mm)	180 x 420 x 360	237 x 563 x 550	200 x 465 x 433	173 x 419 x 368	206 x 453 x 425
PSU rating (W)	300	650	450	300	450
Front panel 5.25in (full-depth)	1	4	3	1	1
Front panel 3.5in	1	1	1	1	1
Internal 3.5in	3	4	4	1	2
Rear ports (see key below)	2U2; 1F; 1P; 1S; 1RJ-45; 1RJ-11; 2SPD; 25SPD; 4M	6U2; 1F; 1P; 1S; 1RJ-45; 2SPS/2; 2SPD; 6M; 4U2; 1F; 1P; 1S; 1RJ-45; 2SPS/2; 1SPD; 3M	6U2; 1F; 1S; 1RJ-45; 2SPS/2; 2SPD; 6M	6U2; 1F; 1P; 1S; 1RJ-45; 2SPS/2; 2SPD; 6M	2U2; 1F; 1P; 1S; 1RJ-45; 2SPS/2; 2SPD; 6M
Front ports (see key below)	2U2; 2M	4U2	2U2; 1F; 2M	3U2; 1F; 3M	2U2; 1F; 2M
Mouse (connector)	Logitech cordless optical (PS/2)	Microsoft Explorer optical (PS/2)	Logitech LX3000 cordless (PS/2)	Compaq optical mouse (PS/2)	Logitech MX3000 laser (PS/2)
Keyboard (connector)	Logitech cordless desktop (PS/2)	Microsoft Multimedia 1DA (PS/2)	Logitech LX3000 cordless (PS/2)	Compaq Easy Access (PS/2)	Logitech MX3000 cordless (PS/2)
Other	Hybrid analog/digital tuner	✓	✓	✓	✓
Operating system	Windows XP Home SP2	Windows XP Professional 2	Windows XP Home SP2	Windows XP Home SP2	Windows XP Home SP2
Recovery method	Recovery CD	Windows CD	Windows CD	Recovery partition	Windows CD
Main titles	Microsoft Works Suite 8.5; Encyclopedia Britannica	✓	Kaspersky Antivirus 2006; Nero 6 DEM	Microsoft Works Suite 2005; Norton Internet Security 2005	✓

1. Price is guaranteed (barring sharp rises in component prices) for duration of issue 2. Warranty is parts & labour unless otherwise stated. Ports key: F = FireWire-compatible, I2 = USB 2, P = parallel, S = serial, G = game, RJ-45 = phone socket, RJ-45 = network socket, SP = SPDIF, M = 3.5mm audio jacks

More new chips and chipsets from Intel

Intel Pentium Extreme Edition 955

[PREVIEW]

Although the news of the CoreDuo and Core Solo processors (see page 46) would seem to sound the death knell for the Pentium product line, the brand name will be around for a little while yet.

Intel's processor roadmap includes Pentiums based on the new 65nm fabrication process. The chip codenamed Presler and now named the Intel Pentium Extreme Edition 955 is the first to hit our Labs. The major performance enhancements between this and the previous-generation dual-core 90nm Pentium Extreme Edition are predictable – more Level 2 cache and a faster clock speed. The 955 has 4MB of Level 2 cache in total, a dedicated 2MB per core. The extra cache accounts for the bulk of the processor's amazing 376 million transistors – well over twice the number in the Core Duo processor.

Clock speed has risen to 3.46GHz against the 3.2GHz of the first-generation dual-core Extreme Edition. Front side bus frequency has caught up with single-core variants too, up from 800MHz to more than 1GHz at 1,066MHz.

There's support for 64-bit systems with EM64T capability, and the 955 also brings a new feature to the fray – support for Intel Virtualization Technology. This is the system formerly codenamed Vanderpool and allows for complete system partitioning, allowing separate virtual machines with separate users to run simultaneously on a single physical system. CPU support for Vanderpool is only one piece of the puzzle though – it requires platform and software support, which is currently thin on the ground.

To go with the new processor is a new motherboard chipset – the 975X Express, consisting of the 82975X north bridge and ICH7R south bridge. The only feature addition over the existing 955X chipset (not to be confused with the 955 Extreme Edition processor) is support for dual graphics, with two PCI Express



▲ The Pentium Extreme Edition 955 includes a phenomenal 376 million transistors.

graphics slots. There is one 16x slot for single-card operation, switchable to 8x for dual-card use in conjunction with the second 8x slot. Intel is calling this Flexible I/O. The dual cards in question have to be ATI CrossFire cards. NVIDIA's SLI is not supported.

The move to 65nm fabrication means lower power consumption per transistor, but with almost 400 million of them running at 3.46GHz, the TDP (thermal design power) of the 955 remains at 130W. It still means an enormous amount of heat for a cooling system to cope with, and precludes

'The move to 65nm fabrication means lower power consumption per transistor. Almost 400 million of them run at 3.46GHz.'

almost any ideas about running an Extreme Edition-based system in anything close to silence.

Accommodating both the 955 processor and 975X chipset is a new motherboard from Intel, the D975XBX. Intel supplied us with an engineering sample for testing. The large passive heatsink beside the CPU – 65mm wide and around 35mm high – is testament to the power needed by a north bridge running at more than 1GHz. Yet more heat is thrown off by the five power transistor heatsinks for the voltage regulator modules. The layout is sensible though, with both the north bridge and VRM sinks arranged around the CPU socket to take advantage of air thrown off by the CPU's heatsink fan. The board will accommodate four DDR2 DIMMs and a maximum of 8GB RAM, and ECC (error checking and correction) memory is supported for increased reliability.

The beta nature of the motherboard BIOS and chipset drivers give problems running CorelDraw under our standard benchmarks, but all other applications ran fine, enabling us to get a good assessment of overall performance. The four logical CPUs of the 955 Extreme Edition (two physical

cores, each with HyperThreading) give a significant benefit in number-crunching tasks, as shown by the score of 1.31 in our 3ds Max 7 render test – a score only beaten by the dual-Opteron equipped HP xw9300 workstation (page 78).

But its strongest result was in the multiple-applications test, where the logical CPUs managed to propel our test system to a score of 1.33 – an impressive showing indeed.

Other results are less inspiring though, and show that there are only limited benefits to be gained from hurling

ever more Level 2 cache and incremental frequency gains at the computing problem. Office applications registered only a 4 percent performance increase compared to our reference Pentium D 840 test PC, audio encoding 6 percent. Video encoding fared better with an 11 percent gain. And the overall benchmark score of 1.15 trails a long way behind fast AMD-based systems like this month's Alienware Aurora (page 84).

Pricing for the Extreme Edition was confirmed as we went to press at US\$999 (around \$1350) – quite a premium for the privilege of owning a

376-million-transistor processor. Intel wants you to buy it for gaming, media creation and, bizarrely, PVR applications. We'd prefer a cooler-running CPU instead. There's no denying that for well-written multithreaded applications, the 955 is a fast CPU. But for general use, it's another disappointing outing for the Extreme Edition range.

David Fearn

PROSPECTS

Fast but only in certain areas, and it's difficult to get excited about a processor that's only 15 percent faster overall than a Core Duo and yet consumes more than 50 times the power.

RESULTS

2D SPEED (EXCLUDING CORELDRAW TEST)



▲ The new processor comes with the new 975X Express chipset.

Chameleon chips

Where to now for the future of CPUs? Shape-shifting processors could be the future of computing, **James Morris** argues.

Computing is at the start of a new era, with new technology promising to put today's best-of-breed dual-core chips in the shade. While the latest processors from Intel and AMD show the first mainstream glimmering of a more parallel way to work, there's an even more radical revolution around the corner – chips that rewrite themselves on-the-fly.

Under the banner of 'reconfigurable computing', these chips work differently to current microprocessors. Modern CPUs from the likes of Intel and AMD are hard-coded with a fixed instruction set of generic operations, which software must be designed to exploit.

But many applications will work faster if the processors include more complex instructions tuned for a specific purpose. This is the philosophy behind additional instruction sets such as 3DNow!, MMX and SSE. Called single instruction multiple data (SIMD), these include functions that execute a string of operations at once. The benefits are best shown by 3D graphics accelerators, which run at a fraction of the speed of a CPU but are capable of rendering 3D at a higher frame rate than any general processor on its own.

Unlike generalised CPUs or specialised GPUs, however, the field-programmable grid arrays

integrated circuits) can be implemented using an FPGA. Bona fide ASICs draw less power and are generally faster, but offer no flexibility. FPGAs can be used to tweak an ASIC design during development, after which it's hard-baked into silicon. But if performance isn't an issue, FPGAs can be used for the finished product as well. With just software to write, rather than a new ASIC to design and manufacture, this makes for a shorter time to market and a potential upgrade path to add new features via a software download.

FPGAs aren't expensive either. Market leader Xilinx's cheapest Spartan-3 chips cost just \$10 apiece. But the FPGA's chameleon-like abilities have a lot more to offer than just becoming a



▲ Xilinx's Spartan FPGAs are among the most popular reconfigurable chips, and cost as little as \$10 each.

nine elements talk to each other via a high-speed Element Interconnect Bus.

The SPUs will be loaded with a program depending on current function. For set-top box usage, they'll be loaded with DVD playback routines for video and audio decoding, display enhancements and so on. In this case, each SPU could be given a different task, but it would also be possible to give each one the same task to be executed in parallel, potentially multiplying execution speed eight-fold.

With the Cell consortium claiming its chip will reach clock speeds in excess of 4GHz, we could see nine cores running in parallel with a claimed 32 gigaflops each. That's a lot of processing power on tap. But this can be unleashed only on software designed to take advantage of the architecture, much as current dual-core processors require properly multithreaded code to show any speed enhancement in individual applications. With more generalised instructions, the Cell will behave more like a single 4GHz PowerPC.

It's still unclear exactly what will be inside the PlayStation 3. Some have claimed it could incorporate as many as four Cell chips, but most reports give it a single Cell running at 3.2GHz. It will also have just seven of the eight SPUs activated to increase yield. This allows one faulty SPU core per CPU, so more chips will pass manufacturing tests. Sony claims that the Cell makes the PlayStation 3 more powerful than Deep Blue, the supercomputer that beat chess grandmaster Garry Kasparov in 1997. With the PlayStation 3 allegedly offering two teraflops of processing power, it's as fast on paper as the supercomputers at the end of the

'Sony claims that the Cell makes the PlayStation 3 more powerful than Deep Blue, the supercomputer that beat chess grandmaster Garry Kasparov in 1997.'



▲ Cray's XD1 supercomputer brings together up to 144 Opteron processors with six FPGAs each to accelerate specialised functions.

(FPGAs) used in reconfigurable computing can be programmed with a different instruction set depending on their use. The announcement that Sony's PlayStation 3 will be powered by a processor called the Cell, which incorporates multiple reconfigurable units, has brought the idea into the public eye. But reconfigurable chips have been around for a while, and are already popular in the DSP (digital signal processor) market.

Any requiring ASICs (application-specific

reconfigurable chip designed by a consortium including Sony, Toshiba and IBM.

Cell, cell, cell

Apart from handling general tasks, the regular CPU deployed alongside the FPGA will also orchestrate how the reconfigurable chips are programmed. The Cell, for example, incorporates a control CPU based on a 64-bit PowerPC chip plus eight FPGAs called synergistic processing units (SPUs). These

last century, such as ASCII Blue and Red. However, this power will only be available for very specific types of operation, such as the 3D game rendering a console is primarily intended for.

The Cell wasn't just developed for games consoles. IBM is also planning to deploy it in blade servers, and has already shown off dual-Cell blades, which would allow a single rack-mount chassis to incorporate 14 processors for a total of 2.8 teraflops. Toshiba, in contrast, is planning to use the Cell in HDTV designs, and has already shown a system capable of decoding 48 streams of MPEG2 simultaneously on a 1920 x 1080 screen.

Greater than the sum of its parts

Due to its huge performance-boosting potential, reconfigurable computing hasn't just been earmarked for consumer devices. It's also been developed into products targeting traditional high-performance computing applications such as scientific modelling and cryptography.

Cray's XD1 supercomputer is built from

in standard configurations. That gives it a potential maximum of 144 Opterons and 864 FPGAs, although most implementations don't include a full quota of the latter.

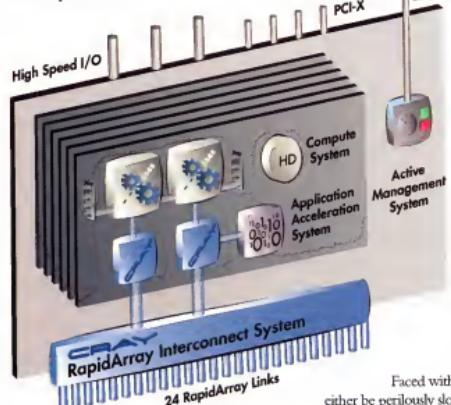
The 144 Opterons on their own are capable of 691 peak gigaflops, but the reconfigurable application acceleration units can boost this considerably. Cray recently sold its largest XD1 yet to the Naval Research Laboratory (NRL) in Washington DC.

Using 244 Xilinx Virtex-II Pro FPGAs alongside its 288 dual-core Opterons (effectively 576 CPUs), the NRL's XD1 is the largest deployment of FPGA technology yet. It will offer a peak performance of 2500 gigaflops. Ranging in price between \$100,000 and \$2 million, the XD1's reconfigurable

'The beauty of the new technology is that it's constrained only by the imagination of those programming for it.'

modules containing one AMD Opteron CPU and an 'Application Acceleration Unit' containing up to six Xilinx Virtex FPGAs. Cray claims that when the FPGAs are configured for breaking cryptographic codes, the FPGAs boost processing speed by factors of as much as 1,000. When performing geological modelling of seismic data, a task regularly required by oil companies, the benefits aren't quite so astronomical. But the FPGAs still make processing somewhere between 15 and 100 times faster.

The XD1 chassis incorporates up to 12 processing modules and can be clustered in a rack of up to 12 at a time.



▲ The Xilinx FPGA-based Application Acceleration System in Cray's XD1 acts as a co-processor.



▲ Sony's forthcoming PlayStation 3 is powered by the Cell processor, which is based upon one 64-bit PowerPC.

to mention the software that runs on it as well.

Keeping up with the Joneses

Bearing these problems in mind, the benefits for manufacturers, developers and end users must be clear. And there's one huge reason to use reconfigurable chips – they don't have to become obsolete when new operations are developed. Need SSE5? It could be just a download away. Obviously, the numbers of gates on the die and the clock speeds will be set at the time of manufacture, but with reconfigurable computing you no longer need be left behind by the latest innovations. In the consumer electronics market, where raw processing power is less paramount, this could mean far more flexible devices.

Imagine a remote control that not only learns the specific infrared sequences to trigger playback on devices from different manufacturers, but can also be programmed to control devices that weren't even around when it was originally manufactured. All that would be required would be a simple downloadable patch to reset the remote's processor.

The voracious disposability of mobile phones could be held at bay too. Reconfigurable chips make ideal soft radio circuitry. If a new frequency band and modulation are required, these could simply be programmed in via a patch. As Stretch's S5000 shows, a properly coded configurable chip can do the job of much faster processors in terms of clock speed, so long as tasks can be broken into large instruction sequences that can be hard-coded as single operations.

Reconfigurability also promises lower costs. Right now, if you want hardware acceleration for new video codecs or game-related operations, these will need to be added via new circuitry, either in new chip designs or add-on peripherals. It's unlikely FPGAs will have the performance to match the latest graphics accelerators from NVIDIA and ATI for your PC – despite its Cell chip, Sony's PlayStation 3 will still include discrete graphics acceleration. But floating-point-intensive operations such as real-time physics processing could well be greatly enhanced by the Cell's reconfigurability.

Nobody really knows exactly where reconfigurable computing is headed. That's the beauty of the technology – it's constrained only by the imagination of those programming for it. But with huge performance and flexibility benefits demonstrated for every level of computer usage, reconfigurable chips will play an increasingly important role in the devices of the future.

Internet security suites

For complete peace of mind, you need a complete Internet security suite. We provide Australia's most comprehensive test.

The Internet is arguably the greatest invention of the 20th century, but it's brought with it a huge number of problems. The first six months of 2005 threw up a colossal 1,862 new vulnerabilities, and if you don't guard your PC against this constantly evolving threat you can be sure a hacker, virus writer or malware author will be lurking on the other side of your broadband connection to take advantage.

First, we had virus infection, which was eventually joined by the trojan and spam problems. Now there's spyware, adware and identity theft to complicate matters. Anti-virus software alone isn't enough, a firewall won't

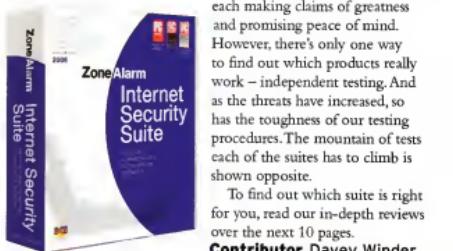
stop spam, anti-spam software won't remove spyware – the list goes on.

You could install separate products for each threat, but then you'd have system stability, application conflict and administrative nightmares to contend with. Alternatively the Internet security suite, integrating several layers of security into a single easily managed entity, provides the best answer.

New products are popping up all the time, each making claims of greatness and promising peace of mind. However, there's only one way to find out which products really work – independent testing. And as the threats have increased, so has the toughness of our testing procedures. The mountain of tests each of the suites has to climb is shown opposite.

To find out which suite is right for you, read our in-depth reviews over the next 10 pages.

Contributor Davey Winder



	BitDefender 9 Internet Security	F-Secure Internet Security 2006	McAfee Internet Security Suite 2006	Panda Platinum 2006 Internet Security	Steganos Internet Security 2006	Symantec Norton Internet Security 2006
OVERALL RATING	★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★
Price (inc GST)	\$88	\$76	\$95	\$98	\$129	\$68
Upgrade (inc GST)	N/A	N/A	\$54	\$54	N/A	\$41
FEATURES						
Anti-virus	✓	✓	✓	✓	✓	✓
Anti-spyware	✓	✓	✓	✓	✓	✓
Anti-spam	✓	✓	✗	✓	✓	✓
Parental controls	✓	✓	✗	✓	✗	✓
Firewall	✓	✓	✓	✓	✓	✓
Bootable rescue CD	✓	✓	✗	✓	✗	✗
Secure file erasure	✗	✗	✓	✓	✗	✗
Vulnerability checker	✗	✗	✓	✗	✗	✓
Data vault	✗	✗	✗	✓	✓	✗
Phone tech support	✓	✓	✓	✓	✗	✓
OPERATING SYSTEM SUPPORT						
Windows 2000/XP	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓	✓/✓
Windows 98/SE/ME	✗/✗/✗	✓/✓/✓	✓/✓/✓	✓/✓/✓	✗/✗	✗/✗
Windows 95/NT 4	✗/✗	✗/✗	✗/✗	✗/✗	✗/✗	✗/✗
Other	✗	✗	✗	✗	✗	✗
PERFORMANCE RESULTS						
Firewall stealth test	Pass	Pass	Pass	Pass	Pass	Pass
Firewall Nmap scan	Pass	Pass	Pass	Pass	Pass	Pass
Firewall exploit test	Pass	Pass	Pass	Pass	Pass	Pass
Anti-virus test	Pass	Pass	Pass	Pass	Pass	Pass
Spam detection	Fail 89%	Pass 96%	N/A	Fail 88%	Fail 88%	Fail 83%
Spam false positives	Fail 9.6%	Pass 0.2%	N/A	Fail 9.2%	Fail 19%	Fail 3.8%
Parental controls	Fail	Fail	N/A	Pass	Pass	Pass
Spyware detection	Fail 50%	Fail 52%	Fail 55%	Fail 66%	Fail 68%	Fail 80%
Spyware removal	Fail 62%	Fail 65%	Fail 62%	Fail 71%	Fail 77%	Fail 72%
Spyware blocking	Pass 65%	Fail 49%	Pass 64%	Fail 55%	Pass 73%	Pass 82%
Integration test	Pass	Pass	Pass	Pass	Pass	Pass

How we test

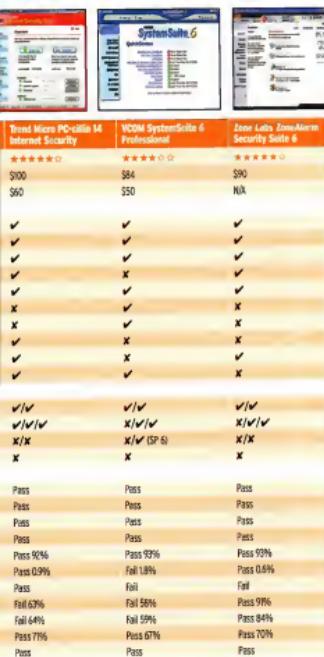
All of our tests are performed on the same base machine as a control unit – an AMD Athlon 64 3400+ desktop PC with 1GB of RAM running Windows XP Professional SP 2. Between product tests, this is returned to its initial state using the same original and 'clean' drive image. So if a program passes the test, it gets a point. So if it passes six out of six, it gets six stars in the Quality rating.

Firewall: 1 point

We test the online visibility of the test computer using the PC Flank Stealth Test (www.pcflank.com), and use HackerWhacker (www.hackerwhacker.com) for a full Nmap-driven scan of all 65,534 ports, checking for open status. We conduct our own vulnerability testing, exposing the computer to a barrage of exploits using the same 'tools' as hackers. All tests have to be passed to get that point.

Anti-virus: 1 point

We first run an EICAR test (www.eicar.org) to check the anti-virus component was alive and working, before introducing the system to 10,000 emails containing a mixture of clean, virus-infected and spam messages. Should any of the known threats go unrecognised by the anti-virus scanner, the result is a fail.



Anti-Spam: 1 point

We don't train any of the anti-spam apps that use Bayesian detection. We use default out-of-the-box settings and tweak any configuration options that are obvious and available, such as language filtering. To pass, the application has to detect at least 90 percent of the spam we throw at it, without wrongly identifying more than 100 messages (1 percent).

Parental control: 1 point

Having set the appropriate levels of control, we log in using a 'child' account and attempt to access 50 websites across the following categories: adult, drug use, gambling, racist and violent content. Successful connection to any results in failure, as does not being able to configure restrictions on individual accounts.

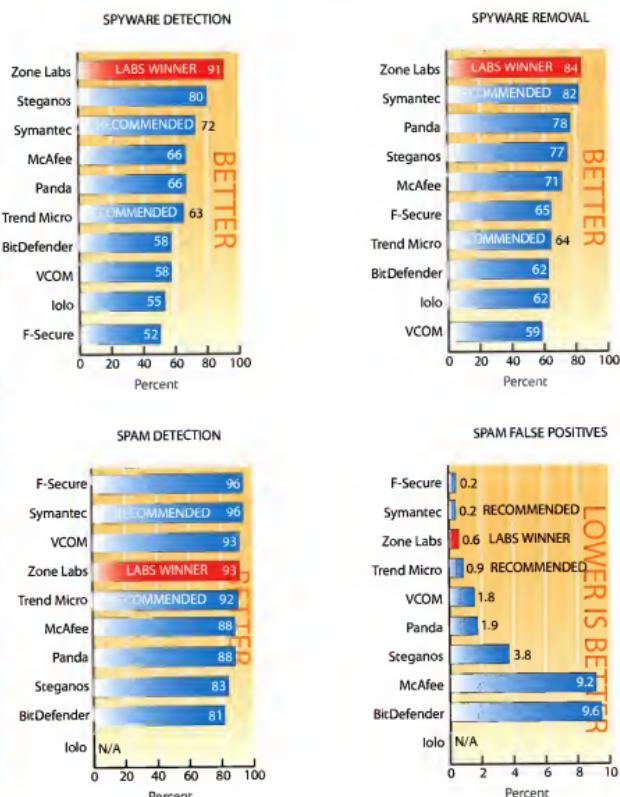
Anti-spyware: 1 point

For these tests, we apply a different drive

image – as used in our anti-spyware group test (*December 2005, page 79*) – pre-infected with a selection of rogue diallers, remote access trojans, browser toolbars, commercial keyloggers and a number of adware components. The standard to beat has already been set by Spy Sweeper 4.5 and Spyware Doctor 3.2 – products have to hit 90 percent for detection, 80 percent for removal and 60 percent for blocking those removed programs to pass. Missing any target is enough to fail.

Integration: 1 point

The provision of an efficient central management console falls far beyond the realms of "ease of use", so we include it within the performance testing results. Successful suites need to configure applications with consistent look and feel, manage definition updates and get both at-a-glance overviews and in depth detail of system security.



BitDefender 9 Internet Security

PRICE: \$88 UPGRADE: N/A

SUPPLIER: BitDefender via website **WEB:** www.bitdefender.com

BitDefender takes safety so seriously that the firewall even suggests you block one of its own components during the install routine – just part of a process so confusing it could trip up even the hardened security-suite devotee. We also weren't reassured by an install routine prompting us to click "continue anyway", despite warnings that the software wasn't digitally signed.

First impressions weren't improved when the firewall was running, with numerous confirmation dialogs - BitDefender has no built-in database of common trusted applications nor the ability to scan your hard disk for Internet-capable applications. The resulting dialogs provide limited information about the application or process concerned, then offer a huge range of options. Instead of the usual 'yes' or 'no, or once' or 'always' confirmations, you're faced with a list including such things as 'deny this port only' and 'deny this remote host only'.

We have no concerns about the quality of the anti-virus program. The realtime scanner looks at incoming and outgoing email messages, P2P transfers and files as they're accessed. But it's the HiVE (Heuristics in Virtual Environment) system that's of most interest. This creates a virtual computer environment where suspect software processes

Best for business

It's all too easy for businesses to be lured into the false security trap. If you've outsourced anti-spam and anti-virus to a third-party service provider then you might think that there's no need to waste money on desktop-level protection. This is certainly true when it comes to anti-spam, as that can be handled adequately at the gateway, but not for the other threats.

You might argue that you're in the small minority whose desktop security policy is understood, enforced and adhered to by all parties. However, it only takes one user to introduce an infected file while showing 'fun stuff' from the USB flash drive they brought in, or visiting one rogue website that's evaded filtering, and your carefully crafted policy is in tatters.

We'd argue that the question isn't whether you need desktop-level security, but which type. At the smaller end of the business ladder, the consumer products may prove sufficient. However, these products lack centralised patch management and administration controls, so if

▲ BitDefender takes a minimalist approach to its main console screen, but the basic information you need is there.

can be run to check for potential malware. The application itself comes on a bootable CD, which lets you disinfect your PC directly from it.

Unfortunately there are compatibility issues when using Spybot S&D, and the developers of BitDefender recommend disabling the virus shield while using it. Worse, the anti-spyware component failed our stringent tests. Both detection and removal rates fell well below our benchmark standard, with keyloggers a particular stumbling block.

However, it redeemed itself by blocking 65

there's a problem you won't spot it until it's too late. And, although improving year-on-year, most security suites still lack the highly detailed event logging coupled to powerful reporting that's required for a network administrator. Most of the reporting on offer is little more than eye candy.

Also beware that few of the consumer products reviewed here are available in specific versions for either small-business or enterprise users. The vendors do sell into the business market, but piece by piece. You'll find most will have an anti-virus, anti-spam and anti-spyware product, combined with those vital patch management and centralised administration tools.

Not everyone does it, though. For instance, Webroot has a mature enterprise version of Spy Sweeper, while PC Tools currently doesn't have a corporate version of the A-Listed Spy Doctor. Although Spy Sweeper doesn't catch quite as much spyware as Spy Doctor, this is more than compensated for by the management tools bringing ease of

percent of programs when we tried to reinstall them, just 1 percent less than the A-Listed Spyware Doctor.

The anti-spam component looked as if it should do well, working with any POP3 email irrespective of the client used but adding a toolbar for both Outlook and Outlook Express for easy marking of messages during the training period. There are plenty of configuration options too, from Bayesian learning to image analysis. When faced with our message base it didn't perform well though, only identifying 81 percent of spam and wrongly identifying 10 percent of messages – far too high. It adds up to under-par performance apart from the excellent anti-virus component.

LABS VERDICT

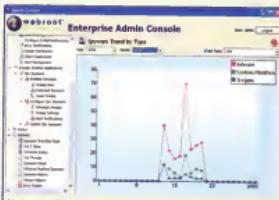
A superb anti-virus scanner, but the rest of this suite is far less assured.



OVERALL



both deployment and administration. When it comes to anti-virus solutions, look beyond the cost and focus on support - Sophos doesn't offer the cheapest solution, but its support is hard to beat. And don't fall for the 'solution costs more than the attack will' argument - you may save a bit of money, but you'll be contributing to the problem. Our bottom-line advice has to be: whatever you do, don't do nothing.



▲ Webroot's enterprise-level version of Spy Sweeper includes far superior trend reporting.

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- CrossFire™ Ready (Software Mode) to deliver multi-GPU
- DVI + HDTV + D-sub support
- New High Dynamic Range visual effects
- Shader Model 3.0

*all specifications are subjected to change without notice.

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F-Secure Internet Security 2006

PRICE: \$111 **UPGRADE:** \$66

SUPPLIER: F-Secure via website **WEB:** www.f-secure.com

F-Secure hasn't been resting on its laurels since last year when it topped our group test. In fact, it's managed to reduce the price while at the same time adding to the feature list.

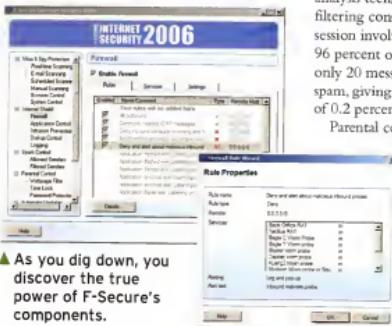
F-Secure ensures confidence is inspired right from the start, with an option on the installation menu to scan the computer before installing. Whether you take this route or not, F-Secure will scan for the Klez virus at the start of the process, removing it before continuing with the installation. After installation, and the subscription validation check, a Security Wizard guides you through default browser and email client options, and then offers to enable parental controls. All of this in less than half the time it took Norton to install.

The central management control console remains a delight to use thanks to the simplicity of the 'at a glance' screens, which provide quick overviews of current security status. However, you can drill down through these same screens to gain access to ever-more advanced configuration options while retaining the same look and feel throughout. This is the hallmark of a truly integrated suite – even where components are based on third-party products, such as the spyware detection, they've been tweaked enough that the joins

Automatic Updates	Enabled	Disable
Last update check	14:52: Successful	
Next update check	Today, 15:01	Check now
Virus definitions updated	Today, 13:25	
Spam definitions updated	Today, 14:16	
Spam Control updated	Today, 13:00	
Webpage Filter updated	Today, 13:59	
Security levels updated	Today, 13:26	
Software updated	Today, 13:55	

Advanced

The update logs provide all the information you need with regard to update status.



don't show. This attention to detail extends to the tray icon, from where you can scan the system for spyware and check a target or your hard disk for viruses.

F-Secure has always been at the centre of anti-virus developments. Its F-Prot anti-virus scanner broke the mould by introducing heuristic scanning, and now it's among the first to introduce specific protection against rootkits. These are used to hide malware out of sight of Windows by operating at kernel-mode level rather than user-mode level. As expected, F-Secure had absolutely no problems in passing our anti-virus tests.

Another new feature is found in the anti-spyware component, based upon the well-established Ad-Aware software. It provides real-time integrated protection together with a new Spyware Cleaning wizard. Last year, F-Secure scored well in our spyware testing, but we've toughened up this section of the labs and the poor showing of Ad-Aware in our spyware Labs was also reflected here. In fact, it failed all three of the benchmarks by some margin: detection 52 percent (pass 90 percent), removal 65 percent (pass 85 percent) and blocking 48 percent (pass 60 percent). We recommend using a standalone anti-spyware product to accompany it.

Not so when it comes to anti-spam though, where F-Secure managed to surpass last year's already impressive test performance. By adding real-time blackhole listing, F-Secure draws upon a database of verified spammer IP addresses, as well as those of known affiliated services to aid the identification of phishing emails. This, combined with the existing F-Secure SpamLab update service, seamless Outlook integration and advanced content-analysis technology, made for quite remarkable filtering considering there was no training session involved. F-Secure successfully trapped 96 percent of the spam we threw at it, and only 20 messages were wrongly identified as spam, giving a truly excellent false-positive rate of 0.2 percent.

Parental control has improved with the addition of a child time-lock feature to enable appropriate times for online activity and these, combined with the highly configurable content-filtration categories, make for solid protection from unwanted content for all the family. However, F-Secure didn't pass our parental-control test, because it



▲ Another thoughtfully designed main console, even if it doesn't convey as much overview information as PC-cillin or Norton.

applies restrictions globally rather than on an individual account basis. Although it's easy to toggle restrictions on or off using the master password, that isn't enough in our search for **SECURITY** perfection.

It's true that the other additions to the 2006 version are limited to eye candy – the 'e-learning tutorial' will be redundant for all but the user who's never seen a firewall or anti-virus scanner before, while the 'virus world map' is only interesting the first three times you look at it – but this is the only place where you'll find superfluous features or graphical excess.

F-Secure has retained its focus on being a fire-and-forget security solution. Its firewall dialogs are informative and user-friendly while in learning mode, and pretty soon you simply forget it's there. Automatic daily definition updates are downloaded and installed without the need for intervention, and needless to say the firewall passed all of our tests.

Free email tech support further marks F-Secure out from the crowd. It's also among the small group of security vendors who include a bootable emergency CD with their product in case the worse should happen. To be honest though, with F-Secure Internet Security 2006 installed, we doubt that it ever would.

LABS VERDICT

A strong product in the core areas of virus, spam and firewall protection, even if the spyware component isn't so impressive. Free technical support just adds to its attractions.



Iolo System Mechanic 6 Professional

PRICE: \$95 UPGRADE: \$54

SUPPLIER: Iolo via website WEB: www.iolo.com

Iolo System Mechanic is similar to VCOM SystemSuite, in that they're both system utility suites with added security features. There's a lot of merit in combining system-security and system-maintenance tools in this way, not least because one affects the other so often. They also include tools often left out by the mainstream security vendors. Iolo has a secure data shredder, for example, yet the mighty Norton doesn't.

Rather than create their complete suite from scratch, both Steganos and Iolo rely on Kaspersky for firewall and anti-virus protection. Unlike Steganos, Iolo hasn't rebranded the applications, but both can be managed from within the integrated System Mechanic control dashboard. Well, to a degree. Unlike a properly integrated suite solution, both run as separate applications

'While there are undoubtedly some powerful tools on offer, there are some surprising omissions.'

and have a different interface to System Mechanic. However, you can initiate definition updates, scans and set configuration options from within that dashboard.

We grew to like the dashboard too. It provides both at a glance reports on PC health and security, and acts as a management console for the numerous components. System status and analysis reports show grades for ratings across six categories: clutter, speed, safety, fitness, update and active care. Alongside these ratings are recommendations for any improvement action that can be taken, with such action only being a single click away in most cases. These one-click power tools can accelerate, repair, clean and secure the PC by individual category, or you can run a 'totalcare' tool that does

everything in one fell swoop.

Focusing on the security front, a Security Optimiser Wizard checks for vulnerabilities and attempts to repair them. However, this isn't a patch on the Norton Protection Center and Security Inspector, which outperforms Iolo on configurability, usability and performance. The bottom line is that Norton finds and fixes more vulnerabilities.

Unfortunately for Iolo, the 'not as good as' label prefixes one of its main components – Spython anti-spyware. This didn't fare at all well during testing, with a detection rate of just 55 percent, removal at 62 percent and blocking at 64 percent – certainly not enough to pass the test.

Spython has minimal user configurability. It's essentially a matter of opting for automatic disinfection of threats or not. If you opt out, Spython will just report, for example, that it found one parasite but without any detail of what it was or options to do anything about it. Opt in and it reports that it disinfected one parasite, and the search results might tell you it was a keylogger, but again there are no options to see what exactly it was – and there's no quarantine view either.

The only logs we could find were available by clicking the 'More Info' link next to the Statistics button on the dashboard, but this was limited to events such as 'opened spython', 'made full scan' and 'spyware removal'. It's here, strangely hidden away, that you can also click an Undo Event link to restore whatever file was removed during a spyware scan.

We liked the System Guard, though. This implements a number of optional security shields to prevent hijacking, such as monitoring startup changes and blocking changes without your permission. It does likewise with browser homepage and search defaults. This proved to be the most effective of the Iolo spyware defences.

A Quick Security Optimization feature tests for myriad vulnerabilities within areas such as Windows remote Registry service, web content zone security settings, trusted publishers, null sessions and hosts file redirection.

Certainly, Iolo has come up with one of the best-looking applications here, but it adds weight to the argument that beauty is only skin deep. Start digging under the surface



▲ The System Mechanic main screen presents too much information, although the main system status section is well implemented.



▲ The system vulnerability scanner is quick and efficient, patching up security holes with minimal user intervention.

and, while there are undoubtedly some powerful tools on offer, there are also some surprising omissions from such a suite.

The VCOM SystemSuite is the only other product that covers the same system utility ground in this group test (although note that Norton SystemWorks 2006 will plug into the same management console as its Security Suite sibling) and it also manages to include anti-spam and does a better job of component integration.

What Iolo System Mechanic does do better than most – thanks in no small part to its choice of anti-virus and firewall provider – is not put your system resources under attack. It's just a shame that the overall security reach is so limited.

LABS VERDICT

The lack of any anti-spam or parental-control features are surprising omissions, and it wasn't a great performer in our tests. Where it wins is its system-maintenance tools.

Quality of software

★★★★★

Features & Design

★★★★★

Value for money

★★★★★



OVERALL



▲ Ironically, Spython provides very little information about the spyware it uncovers.

McAfee Internet Security Suite 2006

PRICE: \$98 UPGRADE: \$54 (via www.mcafee.com.au)

SUPPLIER: www.minidigital.com.au WEB: www.mcafee.com.au

The 2006 edition of McAfee's security suite is notable for what it leaves out as much as what it puts in – a fact emphasised by the precious few headline changes from last year's model.

Daily automated anti-virus definition updates are certainly a welcome change, as is the new gaming mode. This only stops the firewall from popping up unwanted dialogs during that oh-so-vital fraggering session, but if you need it you'll appreciate it. We like the inclusion of a new anti-phishing plug-in to block ID theft sites more though, as well as the overall reduction in the hit on system resources while managing to improve scanning times.

Lef out is a copy of the new AntiSpyware 2006 product, which is a shame as it's spyware detection that really differentiates security suites now. Last year, spyware was becoming a big problem, now it's the big problem. Consequently, security vendors have invested a lot of time and money into getting this component right. Yes, McAfee VirusScan 2006 is included and does detect and remove spyware, or Potentially Unwanted Programs (PUP) as McAfee refers to it.

You can scan separately for viruses or a combination of viruses and PUPs and, although painfully slow, it performed only reasonably well in our tests by detecting 66 percent, removing 71 percent and blocking 55 percent. However, none of these ratings are enough to pass the high standards we set for our spyware tests.

Unlike the standalone AntiSpyware product, this integrated version doesn't have the ability to monitor changes to your system that are indicative of spyware/malware. So changes to browser settings, system files, search page, homepage hijacking and so on will go unnoticed. Getting this level of protection will cost another \$30 if you stick with McAfee. In such a value-a-warmer market as this, we can't help but think that McAfee has misjudged this issue.

Thankfully, this isn't the case with VirusScan 2006, which is as impressive as



▲ The McAfee overview screen covers a lot of ground, but to find out anything useful involves digging.

ever. It's relatively slow in scanning but 100 percent dependable. The ScriptStopper and WormStopper functions have now been copied by the competition, but McAfee pioneered these techniques and their application is faultless here. Needless to say, it sailed through our anti-virus testing.

The same can be said of the Privacy Service, which bundles the same functionality as the ZoneAlarm ID lock, privacy and parental control functions within one integrated module. This keeps private data within an encrypted database and prevents unauthorised leakage via email, IM or the Web. It also handles pop-ups, advert blocking and web-bug detection, and there's an anti-phishing toolbar, although only Outlook, Outlook Express and Internet Explorer users can play with it.

McAfee oushines ZoneAlarm considerably when it comes to parental-control features, allowing a fine level of control over the censorship configuration, applied on a per-user basis. Web content can be filtered using an age-related automatic option, logging of activity, and even time-limited usage restraints.

The firewall remains fire-and-forget thanks to the excellent internal database of known good applications – more than 4,000 of them. For applications and processes not recognised by McAfee, prompts are simple and informative. Playing hunt the hacker using the track-and-trace function is useful, the world map plotting attack locations pure eye candy.

The SpamKiller component started badly, significantly slowing mail download speeds in Outlook. Admittedly, though, our payload was larger than most users see in a single hit unless they've been away for a week. Spam detection has improved since last year, up from 82 to 88 percent, but unfortunately just fell short of the 90 percent benchmark required to pass our toughest test regime to date.

Using a barrage of filtering, including meta-character, invisible text, too many images and intentional misspelling tactics, we weren't altogether surprised to see a poor false-positive



▲ The traffic monitor shows a detailed view of your online activity, broken down by application.

return, up from 6.8 percent to 9.2 percent this year. Although these results quite rightly represent a failure in the spam testing, we must point out that over time these figures will improve as McAfee learns what you regard as spam or otherwise. The 'friends' list composed of your imported contacts and then improved by use of an 'add friends' button will help, but the lack of a corresponding address-based black list is unfortunate. Indeed, unlike ZoneAlarm/MailFrontier, there's no simple way to block an address or domain. Instead, you must construct a filter in order to achieve this simplest and most successful of spam-trapping methods. On the positive side, it filters POP3 mail irrespective of client and handles MSN/Hotmail with equal aplomb, as it does POP3 and Exchange accounts under Outlook.

For anti-virus protection alone, McAfee shone particularly brightly in this group test, but when it comes to the vital double whammy of spam and spyware it falls behind the market leaders.

LABS VERDICT

Strong on anti-virus, parental controls, integration and ease of use, but let down by relatively poor showings on both spam and spyware fronts.

Quality of software	★★★★★
Features & Design	★★★★★
Value for money	★★★★★

OVERALL

★★★★★

PC AUTHORITY March 2006 www.pcauthority.com.au

Panda Platinum 2006 Internet Security

PRICE: \$129 UPGRADE: N/A

SUPPLIER: Panda via website WEB: www.pandasoftware.com

Panda's central management console isn't our favourite here, as it requires you to dig deep to find the configuration dialog you're looking for. However, we do like the self-diagnosis system, which checks the security health of your PC and reports back on what needs fixing. A green dialog represents a clean bill of health, and this is usually only a click or two away.

It's a good idea, as is the CPU load-

management option. This is designed to cut back CPU usage during scans to reduce the impact upon other apps. Toggle it on when you want to work on other things during scans, then off again when you're done. Or that's the theory. We found using both Internet Explorer and Microsoft Word during a scan was an unpleasantly slow process.

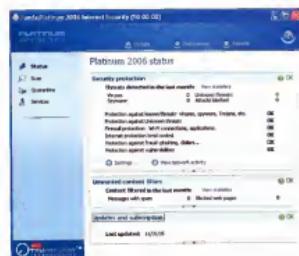
Things didn't improve much in our Labs tests. Like most security suites here, it couldn't pass our tough spyware tests, but although detection wasn't brilliant at 66 percent, removal of 78 percent and blocking of 73 percent is nothing to be ashamed of. Our main gripe was again that many of the configuration options were hard to find. On the plus side, the ability to store default browser settings, such as home and search preferences, is something usually only found in standalone clients. If malware did manage to hijack your browser, restoring it to your preferred state is just a click away.

Parental controls can be set on a per user basis, and the web filtering functioned perfectly in our tests, as did the firewall. This worked almost transparently and required little user interaction. It even comes with Wi-Fi protection to detect and block intrusion attempts via the wireless route.

Anti-virus success was almost a given thanks to the maturity of Panda's TruPrevent heuristic technologies and its lofty standing in the anti-virus world.

However, things went a bit pear-shaped in our anti-spam tests. The scanning of email within Outlook was so slow that we thought it had broken the email client. The results were poor too, with a detection rate of 88 percent and 1.9 percent false positives not enough to pass our tests.

Like last year, Panda's overall performance isn't quite good enough to impress, despite some innovative features and very strong anti-virus abilities.



The overview screen is simple and informative, but the configuration options can get ugly.

Stegano's Internet Security 2006

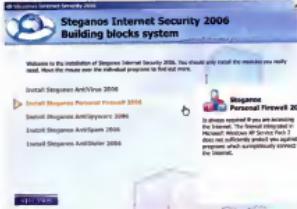
PRICE: \$68 UPGRADE: \$41

SUPPLIER: Stegano via website WEB: www.stegano.com

Stegano takes an unusual approach to the security-suite concept by bundling five separate apps in the one box. This means you have to manage each app separately once installed, which is made more difficult by the lack of consistency between user interfaces. Stegano's argument is that you only install what you really need. This would be fine if it was offering the best choice in each category, but sadly our testing showed this wasn't always the case.

A good example is Webroot's Spy Sweeper, used to power the anti-spyware component. Although we've no complaints with the latest release of Spy Sweeper, Stegano uses version 4 rather than 4.5, which meant none of its results were enough for a pass.

The anti-virus and firewall are both solid choices though, being based on Kaspersky products. The firewall is simple to use and effective enough to pass all our tests without a hiccup. Once up and running, the anti-virus component proved equally strong. Just note that after installing the Kaspersky anti-virus component, its client didn't start automatically – we had to do this manually. There was no system scanning during installation, nor did it automatically scan the system upon starting,



Stegano is the least integrated of the suites on test – the install screen is the last time you'll see all the components in one place.

but in its favour the first 5MB download of updated definitions started without user intervention. And by default, these are then updated every three hours.

Running the AntiSpam module as a separate app to your email client means it should work with almost any client you run, including webmail. But we prefer client-integrated solutions, as clicking on junk/unjunk buttons from the email client toolbar makes training simple. Setting up AntiSpam should have been straightforward using wizards, but despite

informing us that it had successfully grabbed our Outlook mailboxes and added AntiSpam to filter them, it hadn't. We had to manually set up the relevant proxy to get it to work, which was made more complicated by an all too brief Help file that combined English text with German screenshots. Performance didn't impress us much either – detection rate was on the low side at 83 percent and false positives high at 3.8 percent.

Having all these different apps running should mean system resources take a sizeable hit, but as they're all system friendly this isn't the case. However, there's no escaping this suite's poor overall performance in our tests.

LABS VERDICT

Lacking true component integration, Stegano proved not to be the sum of its parts.

Quality of software	★★★★★
Features & Design	★★★★★
Value for money	★★★★★
OVERALL	★★★★★

Symantec Norton Internet Security 2006

PRICE: \$109 UPGRADE: \$73 (via www.symantec.com.au)

SUPPLIER: www.digitalcityonline.com.au WEB: www.symantec.com.au

The Norton pre-installation routine was the most reassuring of all the suites we tested, beating even Trend Micro in the user-friendly and comprehensive stakes.

An initial system integrity and anti-virus scan operation takes place before you do anything else, and Norton gives you the option to view the results log for peace of mind before continuing with the install.

At this point, you have to make a decision as to whether to install with or without 'accounts and parental control'. Opting in means you can configure individual Internet access and protection settings for family members. The parental controls worked well and filtered everything they were asked to, although the omission of any time-based restrictions did stand out.

Like McAfee, Norton recommends you use it instead of the Windows Firewall and Security Center, turning off redundant alerts while you're at it. We recommend you follow this advice, because Norton does a much better job than Microsoft in terms of both presentation and depth. Not only does the Norton Protection Center keep tabs on your current security status in terms of basics, browsing, email and messaging, but it also adds data recovery and system performance 'at-a-glance' monitoring.

The effectiveness of the latter two is wholly dependent upon whether you have Norton SystemWorks installed, and if you do it's unbeatable as a complete system suite, showing both Iolo and VCOM how to properly integrate system and security components.

Norton's firewall is stable and competent,

but we dislike the way it automatically decides if an app can run or not, leaving you to dig around to retrieve it from the black-listed apps dustbin should you ever want to use it again. An option to say yes or no on first usage, as with most other firewalls, would be nice.

Despite this, all our firewall tests were passed with ease. This isn't surprising considering Norton's intrusion-protection technology, which automatically blocks access for 30 minutes if triggered by the new port-scanning detection feature.

Symantec has tweaked the anti-spyware protection since we first saw it a few months back. It's still treated as an aspect of a full system scan rather than a standalone app, which means you'll need to schedule it to do this during a quiet period, because it takes both a long time and ties up system resources. It is, however, thorough and has clearly been updated to catch more keyloggers, as this was its weak point in our last review.

Our stringent tests proved a little too tough though, with Norton failing our detection-rate tests (78 percent) although it did pass the and removal (82 percent), block test with 65 percent. The anti-spam component is also good, with 96 percent of our spam being properly detected and a false-positive rate of just 0.2 percent.

Symantec's anti-virus protection is as complete as it is innovative. Although others have followed, the Outbreak Alert function will automatically update your protection should there be a new high-level threat out in the wild, and inform you that you've been protected. Then there's the Bloodhound heuristic protection against virus-like behaviour from unknown viruses, while worm and script blocking also draw upon heuristic techniques. Needless to say, Norton passed our anti-virus tests with ease.

The central management console with its new Norton Protection Center main screen is easy to use. Tailoring itself to your preferences, environment and behaviour dynamically, it provides a personalised view of security status. Minimising to an icon by the System Tray, it constantly monitors your system security and pops up to warn you if anything needs attention, like an overdue scan or a function not working as expected. One click and it fixes the problem automatically.

There's also a Security Inspector feature that, unlike the Trend Micro version, looks for browser insecurities, checks whether IM accounts are protected by Norton, verifies



▲ Symantec has got its new Protection Center interface just right, with fixes just one simple click away.



▲ LiveUpdate remains the jewel in Norton's crown.

IP addresses linked to your Hosts file, finds Windows services, shared folders that shouldn't be and user rights, and even checks the strength of your password.

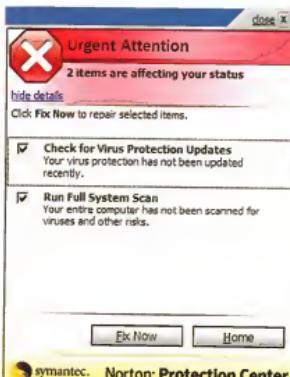
Finally, there's the Norton ace in the hole – LiveUpdate. This remains one of the most efficient and easy-to-use updating tools, adopting a holistic approach to keeping all installed Norton products up to date.

This adds up to an impressive and reassuring package that's only beaten by ZoneAlarm for ease of use, and then only by the narrowest of margins. And it gets even stronger when paired with Norton's SystemWorks.

LABS VERDICT

When paired with SystemWorks, Norton has no serious competition as an integrated system security package. But even on its own, it offers stunning all-round performance.

Quality of software	★★★★★
Features & Design	★★★★★
Value for money	★★★★★
OVERALL	★★★★★



▲ Even the Protection Center pop-ups are timely and to the point.

Trend Micro PC-cillin 14 Internet Security

PRICE: \$100 UPGRADE: \$60

SUPPLIER: Trend Micro via website WEB: www.trendmicro-consumer.com



The maturity of Trend Micro PC-cillin 14 is apparent as soon as you insert the CD. Not only does it check for the existence of other firewalls that may cause system instability, but it also offers to remove them. Refuse and installation will abort, as it will even if only traces of something such as Norton are found. This is a common occurrence, as a Norton uninstall usually leaves the LiveUpdate component behind. PC-cillin will also turn off the Windows Firewall and perform a thorough malware scan, continuing with a quick and painless installation process.

Post install there isn't quite such attention to detail. You're presented with a 'getting started' tutorial, but the main control console doesn't open automatically. We found that doing so triggered an update check, and a 13MB file was needed despite us downloading the app on the day of release. Subsequent updates are, of course, much smaller.

A vulnerability-check feature looks for OS and browser vulnerabilities, but doesn't offer any information on what it finds – only a Microsoft Security Bulletin reference number for you to go and look up. However, we have no such qualms about the solid Antifraud Wizard, which is essentially a one-stop configuration shop for the fraud-protection components. These include things such as checking the status of real-time spyware protection, spam and fraud filters, web phishing filters, and even prompting for entry of credit card and bank account access passwords for the privacy-protection function.

We've always been impressed by the quality of Trend Micro Antivirus. The only notable change is

▲ PC-cillin has our favourite central management interface, with the simplicity belying the power just beneath the surface.

an improvement to the Outbreak Warning System, which pushes alerts out to you on new threats and performs an automatic update to counter it. A pop-up manager in the Network Security section enables you to toggle all system pop-ups.

The anti-virus tests were passed without problem, as were the barrage of firewall exploit

▲ The Antifraud Wizard is a welcome addition to the PC-cillin armoury, assessing your vulnerability and fixing it in one fell swoop.

'Realtime spyware protection keeps what Trend Micro calls 'Grayware' apps at bay.'

tests. PC-cillin has one of the least conspicuous firewalls, with minimal configuration options, which just gets on with the job. Remote PC-cillin management of other computers on your network is possible, as is detection of potential intrusions into your wireless network.

Realtime spyware protection keeps what Trend Micro calls 'Grayware' apps at bay. By this, it means the likes of adware, diallers, remote access and hacking tools. The Anti-Spyware scanner is easily scheduled and configured, including a one-click option to configure exception lists. Although its spyware scanning has improved over last year's tests, it fell short on detection (63 percent) and removal (64 percent), and so sadly must fail. We say sadly, because the blocking rate of 71 percent is the highest we've seen.

In contrast, although PC-cillin passed our spam-filtering test (detection, 92 percent; false positives, 0.9 percent), we aren't overly happy with its execution. To start with, configuration is minimal, with just a low-to-high slider and a black/white list. But our real concern is the lack of junk/not junk toolbar buttons in Outlook. Instead, Trend asks users to forward spam that isn't tagged as such to an email address, and astonishingly it requests the same for messages incorrectly tagged as spam. Now excuse us, but we're not sending copies of our confidential email to anyone.

We can't accuse Trend Micro of not putting enough thought into the central control console. This is uncluttered, yet most advanced features are but a mouse-click or two away. From here, you get

true component integration with access to every configuration and control option, plus system summaries. If the devil is in the detail, this should be PC-cillin 666. We love the fact, for example, that you can view all component logs from a single event log screen. Definition updates are also handled centrally. Not only is this process seamless

and quick, but you can change from the default three-hourly checks to variables between one and 48 hours as required.

A 'revert' option automatically loads the last-known good configuration in case of problems. This was no doubt inspired by the corrupt update that caused chaos in Japan in April 2005, sending PC-cillin into a loop and consuming 100 percent of system resources.

Last year, we were unimpressed with the parental controls offered by PC-cillin, as they simply didn't work during our Labs-testing routines. There were no such problems this time around, and the ability to create custom control configurations for different users makes for real family friendliness.

Overall, PC-cillin 14 is an impressive package. Aside from the spam-filter training, everything from the superb interface and total integration of component parts through to real-world performance is stunning.

LABS VERDICT

An all-round performer that shows exactly how integration and power can go hand in hand. Let down by bizarre spam-filter training, but superb in all other respects.

Quality of software ★★★★★

Features & Design ★★★★★

Value for money ★★★★★

OVERALL ★★★★★

▲ The vulnerability check is less impressive, being short on information and duplicating the Windows Update scan functionality.

Risk Level	Target	Potential Incident	Re.
N/A	N/A		MS
N/A	N/A		MS
Very	Windows	HKT_EXPLANI_AHKT1_PNG	MS
High	Windows	HKT_EXPLANI_AHKT1_PNG	MS
Very	Windows	HKT_EXPLANI_AHKT1_PNG	MS
N/A	N/A		MS

Run Windows Update Run Office Update

Microsoft Windows and Office updates are designed to be known Microsoft security vulnerabilities

Close window if no vulnerabilities are found

Close

VCOM SystemSuite 6 Professional

PRICE: \$84 UPGRADE: \$50

SUPPLIER: TVCOM via website WEB: www.v-com.com

Both VCOM SystemSuite and Iolo System Mechanic fall into the category of system suites with added security, rather than being primarily security suites with added functionality.

However, as system maintenance and system security are so closely intertwined, they certainly do not look out of place here. As with Steganos' suite, this is a collection of many parts, which uses carefully sourced partners to provide its anti-virus, anti-spam and firewall components.

What VCOM has done differently is integrate them all under the QuickStatus central console. Although this integration isn't complete – don't expect Norton, McAfee or ZoneAlarm-like management – it does provide instant views of system status and access to all of the applications.

The only real sign of being disjointed was during installation, with the anti-spam component not installing with the main suite, but rather as part of a 'bonus' software selection. The only other relevant app of note is a copy of Tenebril GhostSurf, a program that allows for anonymous browsing should you require it.

The anti-spam in question is MailWasher, although we were initially saddened to see it was the free standard version of the program. However, when we ran the recommended 'check for updates' link before installing, it provided us with the download of a fully licensed copy of the latest MailWasher 5 Professional instead.

This is a very competent anti-spam app, although it does take a lot of training and some getting used to. It wasn't quite good enough out of the box to pass our tough spam tests, detecting 93 percent of the spam correctly with false positives of 1.8 percent, but we'd expect it to move into 'pass' territory once trained.

The NetDefense firewall is, in fact, a Sygate-

powered app and so should be a mature and efficient option. Unfortunately, installation had more than its fair share of guesswork about it, leaving us scratching our heads as we were bombarded with a series of conflicting warnings: 'firewall could not be started', 'try again in a few seconds' and finally 'start from wizard after setup'.

Well, not quite finally, because just before the system rebooted we got another dialog pop-up informing us that the firewall was shutting down.

Either it started or it didn't, and such conflicting messages do little to inspire confidence in such a vital security component. Having said all of that, once up and running it sailed through the security tests.

Both anti-virus and anti-spionage applications are powered by Trend Micro, so it isn't totally surprising that they did well in our tests.

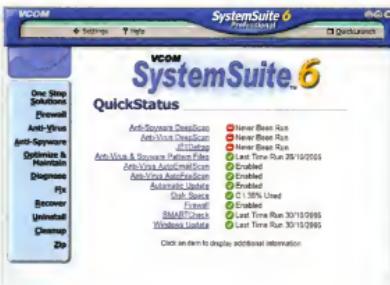
VCOM's anti-virus scanning was speedy, and having direct links back to the superb Trend Micro online database of virus and exploit definitions means you should always be well informed when it comes to making a 'keep or delete' decision.

This also applies to the spyware definitions, but VCOM SystemSuite surprisingly struggled in our tests. Theoretically, it should be using the same definitions database as Trend PC-cillin 14, so we must assume it's using an older anti-spionage client. Unfortunately neither VCOM or Trend Micro would confirm this when we asked.

What we do know is that VCOM detected 58 percent compared to PC-cillin's 63 percent, removed 59 percent instead of 64 percent and blocked 67 percent not 71 percent. From the Labs perspective, it's irrelevant, as both sets of scores represent a fail anyway.

This is the first time we've looked at VCOM SystemSuite, and we were impressed by the choice of security components, as well as the breadth of system tools included. There are 50 or so tools, covering everything from diagnostics to cleaning, including secure deletion of files and a hard disk failure warning system, plus the bootable CD doubles up as rescue tool.

Somewhat surprisingly, given the otherwise excellent breadth of coverage, parental control



▲'At a glance' sums up the main VCOM status screen – there's not a lot of useful detail here, that's for sure.



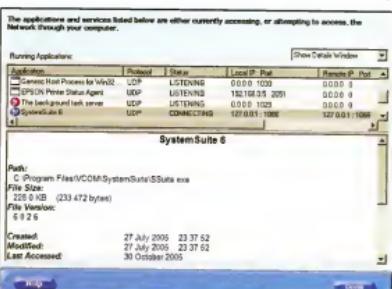
▲However, as you progress through the screens, you start to appreciate the simplicity of the interface.

was a notable absentee. This, coupled with the fact that definition downloads are a little disjointed because each component requires separate downloads – unlike the fully integrated Symantec LiveUpdate, for example – holds it back. Norton Internet Security coupled with SystemWorks beats VCOM for truly comprehensive and integrated system management.

We also feel obliged to point out that SystemSuite displays overblown ads for other VCOM products while updating, which is irritating and inappropriate given that this is commercial software and not some adware-driven freebie.

LABS VERDICT

An impressive debut for VCOM, unfortunately let down only by lacklustre anti-spionage performance and a lack of integration between its component parts.



▲The firewall status screen may look sparse, but all the info you need is displayed and clarified.

Zone Labs ZoneAlarm Security Suite 6

PRICE: \$90 UPGRADE: N/A

SUPPLIER: Zone Labs via website [WEB: www.zonelabs.com.au](http://www.zonelabs.com.au)

last year, we complained that ZoneAlarm had fallen behind the times by not including a dedicated spyware scanner in its flagship suite. That failing was soon corrected. Zone Labs has filled the gap with kernel-level spyware prevention that integrates fully with the anti-virus module. Both components are sourced from Computer Associates, Zone Labs' parent company, and present themselves as a single consolidated interface controlling the detection and removal of viruses, spyware and malware.

Ease of use has always been a ZoneAlarm strength and, while you can tweak and configure every component easily, there's little point when it comes to anti-spyware, as the default automatic setting works right out of the box. In our tests, ZoneAlarm was the only product that gave the standalone spyware benchmarks a run for their money and the only security suite to pass. The detection rate of 91 percent is just 1 percent shy of Spyware Doctor, removal rates 4 percent short on 84 percent, but blocking beats it (although not Trend Micro PC-cillin) with 70 percent.

There's nothing too shabby about updates for anti-virus and anti-spyware either. Both are handled automatically, in the background, with negligible impact on system resources. If spyware is detected, ZoneAlarm provides detailed info and advice regarding treatment.

Not much is new with the anti-virus component beyond the spyware integration, but there wasn't much wrong with the excellent CA module before. We were pleased to see the addition of a pause/continue function for the scanner, enabling you to devote all those processor cycles to something else should you so require, and a quarantine management area for infected files you don't want to, or more likely can't, clean. ZoneAlarm flew through our anti-virus tests as competently as its spyware scanner.

Rootkit exploits are detected by ZoneAlarm's new Triple Defence Firewall. Effectively, you get the proven and mature ZoneAlarm stateful stealth firewall to guard the network perimeter; a



▲ ZoneAlarm's main status screen makes good use of tabs while still allowing plenty of info to be displayed.

second firewall wraps itself around every software app to protect good programs from bad; and the third layer is the OS Firewall to protect the OS, Registry and file system from attack. Thanks to the SmartDefence Advisor that Zone Labs

'If spyware is detected, ZoneAlarm provides detailed info and advice regarding treatment.'

introduced last year, the firewall needs no tweaking, with the advisor passing default policy from the SmartDefence team at Zone Labs directly to the user. The SmartDefence service also provides real-time updates and new attack-protection capabilities, and is pretty much the brains behind most ZoneAlarm services (from the DefenceNet community input for spyware attacks to the advisor for deploying policy automatically).

Another new feature that works well is the automatic kill control. This gives the SmartDefence Advisor the ability to disable programs attempting dangerous or damaging activity without the need for user input. Zone Labs' database of more than 10,000 Internet-facing apps means you get minimal/generic host process' alerts to confuse you and fewer annoying false alarms requiring intervention.

The previous version of ZoneAlarm didn't cope well with spam, letting too much slip through the filter and not reaching the 90 percent success rate to pass our test. Things have improved this year, though, with a detection rate of 93 percent and only 0.6 percent false positives. The MailFrontier-driven anti-spam component is, like all others, fully integrated into ZoneAlarm, with all configuration options available from the main management console. It also integrates superbly with Outlook, providing a toolbar with buttons to mark as junk or otherwise, and also options to quickly black list

▲ The anti-virus and anti-spyware scanners perform almost as well as they look good.



▲ Although it works well out of the box, tweaking the filters for perfect spam squishing is as easy as it gets.

or white list the sender or the sender's domain. Detailed statistical reporting of your spam history is available directly from within Outlook.

The anti-phishing function identifies all the usual eBay/PayPal/banking scams and moves them to a fraud folder. Used in conjunction with the existing ID lock that alerts the user whenever personal information is about to leave the computer, and the host file lock that prevents hackers from modifying the local host files, ID theft protection is superbly covered.

Elsewhere, Zone Labs hasn't fiddled too much. The automatic network detection has been tweaked for Wi-Fi and now identifies unsecured wireless networks and automatically sets appropriate security levels. Instant Messaging protection, parental control features, ad blocking, cache cleaning, mobile-code control and email attachment quarantining remain impressive.

What prevents ZoneAlarm from getting a clean slate is its inability to set web-filtering configurations per account. This seriously restricts the usefulness of the otherwise well thought-out parental controls. This is the only blip in an otherwise superb product, with its performance in all the other tests enough to retain its A-List status.

LABS VERDICT

With anti-spyware skills to match the standalone clients, excellent spam filtering and the best software firewall in the business, ZoneAlarm maintains its A-List position.

Quality of software	★★★★★
Features & Design	★★★★★
Value for money	★★★★★
OVERALL	★★★★★

Questions & Answers

David Moss investigates some missing links and discovers the source of some obese folders, while revisiting metadata and its removal.

DISC EJECTOR

Q Is there a way I can place a button on my Windows Desktop that ejects the disc in my DVD drive?
H. Realm

A There are utilities that can do this, or you could write VBS code, but my favourite way is to create a shortcut to the DVD drive on the Desktop. To do this, go to Start | My Computer, right-click and drag the CD/DVD drive icon onto the Desktop. Choose 'Create Shortcut here' from the pop-up menu and then place the icon where you want it.

To remove a disc from the drive, just right-click your mouse on the icon and choose Eject from the list.

MISSING LINK

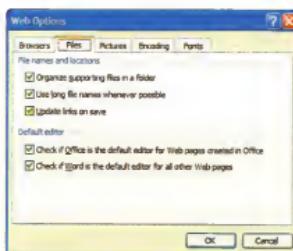
Q How exactly do links work in Microsoft Word 2003? Sometimes I get a link that shows all the path details, and other times I just get a sort of short link with only the last part of the path indicated. I'd like some consistency in this for my documents. Is there a way to do that?
H. Ernest

READER'S TIPS 1: IE Temporary Files revisited

This tip came in from Peter Vincent, citing an easy way to empty the Internet Explorer Temporary Files folder: 'I often see references to clearing out the Temporary Internet Files folder for problem solving, reducing disk usage and troubleshooting. I've long since set Internet Explorer to clear out the folder every time it closes, so I no longer have to worry about this.'

'I realise this might not be good for dial-up users, but many people have broadband, so refetching a page isn't a big problem. Bear in mind that if, like me, you often shut down with Hibernate, the files won't get cleared. However, I still make a point of rebooting occasionally to let XP do its housekeeping.'

Thanks for that, Peter. For those of you who like this idea, here's how to enable it: fire up Internet Explorer and head for Tools | Internet Options. Click on the Advanced tab and scroll down the Settings window to the Security section. Look for an entry

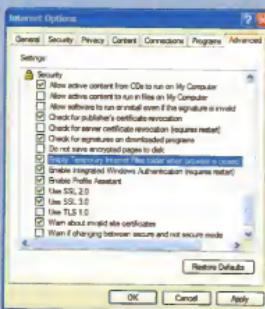


If 'Update links on save' is enabled, Word will use Relative Hyperlinks by default.

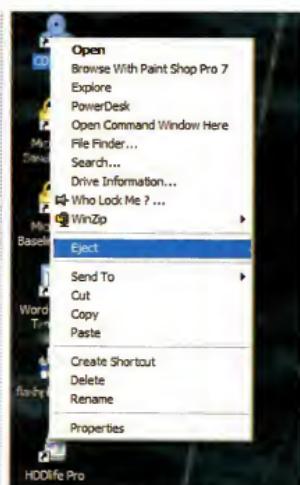
A Microsoft Word 2003 recognises navigable links, like a Web URL or somebody's email address, and shows them in blue text with an underline. If you don't want such one-off hyperlinks to be created, hit <Ctrl-Z> after the underline appears and it will be converted back to plain text.

If you never want hyperlinks to be created, go to Tools | AutoCorrect Options... and click on the tab labelled AutoFormat As You Type. The last checkbox in the 'Replace as you type' section, labelled 'Internet and network paths

labelled 'Empty Temporary Internet Files folder when browser is closed'. Check the box to enable and then click OK to close the dialog.



Set Internet Explorer to automatically empty its Temporary Internet Files folder.



Create a shortcut to your CD drive on the Desktop to enable fast disc ejection.

with hyperlinks', is enabled by default, so click to disable it and stop hyperlinks being created. The default way to follow a hyperlink in a Word 2003 document is by a <Ctrl-Click>, but you can modify this so the Ctrl key isn't needed and you just click once. Go to Tools | Options... and click on the Edit tab. Under 'Editing options', disable the checkbox labelled 'Use Ctrl-Click to follow hyperlink'.

The type of link that gets created when you type a web URL like <http://www.pcauthority.com.au> is called an Absolute Hyperlink, which means it contains the full address. However, there's another type called a Relative Hyperlink, which is best explained by means of an example. The Absolute Hyperlink to this article on my PC is C:\Documents and Settings\david\My Documents\My PC Authority Work\qa136.doc.

This can be split into two sections called the Hyperlink Base and the Relative Hyperlink. In the example above, the Hyperlink Base is 'C:\Documents and Settings\david\My Documents' and the Relative Hyperlink is 'My PC Authority Work\qa136.doc'.

The default behaviour in Microsoft Word 2003 is to create Relative rather than Absolute hyperlinks, so if I placed a link to this article

in another document, located in another folder but with the same base of 'C:\Documents and Settings\david\My Documents', only the relative hyperlink 'My PC Authority Work\qa136.doc' would be used.

This is controlled by a setting in Web Options called 'Update links on save', which you can get to from Tools | Options... by clicking on the General tab and then on the Web Options... button at the bottom. Once the Web Options dialog opens, click on its Files tab. As long as this option remains checked, Word will continue to use Relative Hyperlinks, so uncheck it if you want to force Absolute Hyperlinks in all documents.

Alternatively, you might be happy for Word 2003 to use Relative Hyperlinks most of the time, but on occasion you want to force an Absolute Hyperlink. To do this on a document-by-document basis, create the document, head to its File | Properties, look for the edit box

labelled Hyperlink Base and type in 'x' (without the quotes), then click OK.

You might also wish to retain Relative Hyperlinks, but on occasion need to change the Hyperlink Base. To do this, follow the steps I have just outlined, but instead of inserting an 'x', type the new Hyperlink Base path. Should you need to override this newly forced Hyperlink Base in a document, go to Insert | Hyperlink and type the full path into the Address edit box.

OBSEU UPDATES

Q My son and I run similar computers and we have both found the following folders in the C:\Windows directory: \$NTUninstallKB867282\$ and 45 similarly named folders taking up 580MB of space. Also, in /SoftwareDistribution/Download, eight folders are taking up 72MB of space on my computer. These folders are increasing in size with, I guess,



▲ Force Absolute Hyperlinks by modifying the Hyperlink Base.

each new Windows update. Are they necessary and how big will they grow? J. Henshaw

A They will indeed keep growing as each software update is added to your system. Each folder contains

READER'S TIPS 2:

Over to Jon Mitchell for a fast way to save bookmarks in the Firefox browser:

'I read your answer to J. Read in PC Authority, January 2005, page 98 regarding the location of the Firefox bookmarks. While your answer was

excellent, there is an easier way. Just open up the Bookmarks Manager in Firefox (Bookmarks | Manage Bookmarks), then go to File | Export in the Bookmarks Manager and choose the place to save your bookmarks.'

Have the skills but want a lifestyle? Just \$18,700 buys your life back...



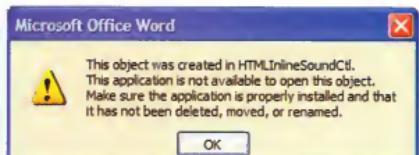
- Be your own boss
- Take control of your time & finances
- Nationally recognised brand
- Join an energetic, supportive team
- Be part of the next generation IT service model

(Master franchises also available)

Have you got what it takes?

Jim's Computer Services needs more franchisees now — people who are professional, self motivated with excellent IT skills and experience who want to take control of their life. If you fit the bill and would like to find out more, then contact us via our web site or on 131 546 for an obligation free information pack and confidential discussion.





▲ Try to insert the Sound Web Tool in Microsoft Office Word 2003 (in this instance) and this is what you'll see if you're running Microsoft Windows XP with Service Pack 2 installed.

the files necessary to uninstall the patch or service pack referred to by the Knowledge Base article number in the file pathname. The format of a patch, for example, with its accompanying Knowledge Base article looks like: %SystemRoot%\%NtUninstall\KBArticleNumber\\$.

Some will vary slightly from this format, but they all hold the originals of files that were replaced by a patch or service pack. It could be argued that if you never intend to uninstall a patch, you could delete these folders, but you need to decide whether it's a good idea to wipe out the only way of completely removing a bad patch – something you may not even know you need to do until other patches have been applied.

If one or more patches have been installed since a bad patch, you must uninstall them all in reverse order before you can uninstall the rogue. You can't uninstall a patch on its own unless it's the very last one applied. Patches appear in the Add/Remove Programs list, and if you try to uninstall one that isn't the most recently installed you'll receive warning messages telling you that it's a seriously bad idea which could affect the way programs run. However, if you just wade in and delete the folders, you won't get any such warnings.

Also, as successive service packs are applied, the patches that appear in Add/Remove Programs will change too, because each service pack effectively contains all previous patches rolled up into it. Therefore, whenever a new service pack is applied, the ability to individually remove old patches is lost.

Regarding your second question – what to do about the /SoftwareDistribution/Download folder – my advice is to leave all the folders in the SoftwareDistribution tree alone too. This is where Windows stores information related to the Windows and Microsoft Update services. If you open the reportingevents.log file, which you'll find in the root SoftwareDistribution folder, you will see that it records the success or otherwise of downloads and installations from the Windows Update or Microsoft Update sites.

How big will these folders grow? My own PC has been up since the middle of 2003 and they're consuming about 562MB of disk

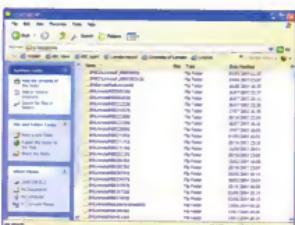
space. That's a fair chunk, but I would rather keep the ability to uninstall if needed than sacrifice it to save space I don't currently need anyway.

However, I can appreciate that your opinion might differ on this matter. While I don't think that it would necessarily harm your working

system if you did choose to delete these folders, I can't categorically say that it wouldn't, so my best advice would have to be leave them alone.

SOUNDS DODGY

Q I'm trying to insert a sound in to a Word 2003 document using the Sound function obtained via the Web Tools toolbar. However, a dialog



▲ NtUninstall folders are hidden system folders and they're used to store the files changed when a patch is applied to the operating system or other applications via Windows Update or Microsoft Update.

box appears that says, 'This object was created in HTMLInlineSoundCtl. This application is not available to open this object. Make sure the application is properly installed and that it has not been deleted, moved or renamed.' How can I fix this?

C. Carter

READER'S TIPS 3: Locally cached profiles

Jason Bamforth wrote in with this solution to the cached roaming user profile problem:

'I solved the problem by using delprof.exe, a freely downloadable program from Microsoft, which can be set to delete locally stored profiles from the client machine after a set number of days. The DelProf script can be applied using group

A I'm sorry to say that you can't, or to be more precise, you could but you probably wouldn't like the solution. When you installed Windows XP SP 2, it disabled three of the tools available from the Microsoft Word 2003 Web Tools toolbar, namely: Movie, Scrolling Text and Sound.

So long as you have Windows XP SP 2 installed, there's no way of forcing Word 2003 to let you use those controls. These tools (all ActiveX controls) were disabled because they posed a 'security risk' according to Microsoft. While I can see that scrolling text might pose a bad-taste risk, Microsoft hasn't been any more forthcoming, so I'm not sure why the Marquee, HTMLInlineSoundCtl and HTMLInlineVideoCtl is so dangerous.

SLOW AWAKENING

Q Is there a particular reason why Windows XP sometimes takes an incredibly long time to get itself together after my system has been in Hibernation mode? It isn't always bad, but sometimes it's so slow you can literally see the Desktop wallpaper being redrawn almost on a pixel-by-pixel basis. What causes this happen?

P. Johnson

A Problems of that nature are almost always memory related. I suspect you have a few processes running constantly that are eating up memory, and if you're hibernating a system opposed to shutting it down, it'll probably get worse.

Once Windows starts to run low on memory, it probably won't use read-ahead caching when it's asked to come out of hibernation, and things like Desktop wallpaper will suffer.

Read-ahead caching is the process whereby items are placed into memory ahead of the time they'll be called on, to improve system response. This is often used by disk drives as file data is placed into an onboard cache as a large file is being read from the disk.

You might find that part of the problem is the size of the wallpaper as well. Windows is known for getting itself into a bit of a pickle memory-wise if you do a lot of hibernates and resumes, so I recommend you employ a restart every so often.

policy on logoff or shutdown. This means you could create a script to run at user logoff that scans and deletes any profile, say, older than 10 days from the client. I've implemented this at my current site and it works very well.'

(See David's Tip 1, opposite, for details of how to get DelProf and how to operate it.)

Ray of light

Tom Araah sheds some light on the dark art of 3D rendering.

Rendering is the key to successful 3D graphics, but few users have much idea of what it involves – and for very good reason, because the underlying theory is highly technical and the implementation complex. However, to take full control of this crucial process, you need to understand the basic principles at work. So here's a greatly simplified guide, from basic ray casting right through to today's state-of-the-art global illumination, image-based lighting and ambient occlusion.

Rendering, like human vision itself, is all about light. Some light source emits photons that bounce around between real-world objects, some of which eventually land on the retina of your eye. The problem for computerised rendering is that there are an unimaginable number of photons buzzing around the world in front of you, and they can't all be included in a 3D model. However, since light travels in predictable straight lines, or rays, a 3D application can reverse-engineer the scene, tracking only that tiny fraction of rays that actually enter the observer's eye – that is, just those that pass through each pixel of the onscreen image on their way to the observer's eye or 'camera'. Effectively, the camera is treated as if it were a light source that casts rays through the pixel grid of the screen (or the bitmap if you're not rendering directly to screen) that then hit the nearest objects. Each rendered pixel value is then based on the interaction of the light with the material properties at that point of contact. This back-to-front, eye-first, ray-casting approach cuts out more than 99.9 percent of all the calculations and makes computer 3D rendering feasible.

However, it's still a far from simple operation. Say you're rendering an 800 x 600 scene that contains 30 objects. Before each pixel's colour can be calculated, every object's geometry must be tested against every ray cast, to determine which

point is nearest to the eye. This requires around 14,400,000 (800 x 600 x 30) complex intersection tests! Breaking down the scene into blocks can cut some unnecessary processing, but it's no wonder that rendering is the ideal time to go and put the kettle on...

And ray casting is only the beginning – rendering gets a lot more complex and time-consuming. The quality of a simple render like this would be unacceptably poor due to a jaggy stair-step effect along any edges that aren't completely horizontal or vertical. The solution is to anti-alias the scene by breaking down each pixel into subpixels – anywhere between 2 x 2 and 64 x 64, depending on desired accuracy – then working out the returned colour for each and averaging them. If this had to be done for every pixel, you might as well just increase the overall image dimensions and take a massive performance hit, but anti-aliasing can be applied intelligently during a final render pass, based on the geometry of the scene and, where necessary, on sharp colour boundaries.

Anti-aliasing produces a smoother result, but one that still lacks realism – in a raw ray-cast render, everything looks flat and unnatural because there's no lighting interaction between the objects in the scene. To begin with, there are no reflections, which is far more significant than you might think. Look around you now and you'll see that it's not only mirrors that reflect, but every shiny surface – metal, polished wood, ceramic, glass and so on. To render reflections, the renderer needs to follow each cast ray further, beyond the first object it hits and on to the object it bounced off before that. This extension of the ray casting principle is called ray tracing. Since light travels in straight lines, it's mathematically simple to work out in what direction to send each secondary reflection ray, based on the angle at which the primary ray struck the reflecting surface. This intersection-seeking reflection ray is used to find the nearest point in the new direction, and the colour of this secondary sample is calculated and fed back into the calculation for the primary sample. Should the secondary ray hit another reflective surface, this process is simply repeated recursively until a fixed number of secondary rays (the ray depth) is exceeded, or



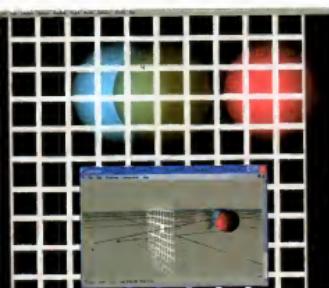
▲ These days even budget 3D applications such as Carrara 5 offer advanced rendering features such as IBL.

its contribution to the final pixel value falls below a certain threshold.

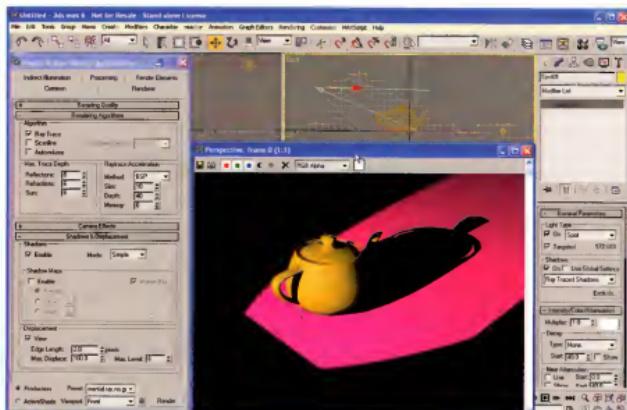
That handles direct reflectivity but still leaves a range of other materials that need to be replicated. Semi-transparent surfaces like glass, water and see-through plastics are less common than reflective surfaces, but look terrible if not correctly rendered (like a solid white glass of water). The solution for rendering transparency is again through ray tracing, sending out secondary rays to find the nearest object the light would have reflected off previously, then propagating its colour back to contribute to the final rendered pixel – a glass of water no longer appears solid, but instead you can see the objects behind it.

However, to make the effect truly believable, another characteristic of light has to be taken into account – refraction. When light passes between materials of different optical density – say, air to glass and back to air again – it changes direction based on its angle of incidence. Tweaked ray-tracing algorithms allow the direction of refraction rays to be correctly deflected, based on a refraction setting in the object's material property.

Reflection and refraction tracing improves the realism of rendered scenes enormously but still leaves a major problem – so far, the lights in a scene are casting light, but they're not casting any shadows. For this to happen, each sample point visited by a traced ray needs to know whether it's actually being lit by each of the scene's light sources or not. To find out, imagine you're standing at a sample point, then look toward each light source in turn – if you can't see it you're in that light's shadow. This means the ray-tracer has to send out a further set of intersection-seeking secondary rays known as shadow rays. Unlike reflection and refraction rays, such shadow rays don't need to work out the nearest object or



▲ Ray tracing extends the ray casting approach to vary the primary sample's colour based on secondary samples.



▲ Ray-traced shadows are too hard to be realistic.

send back any colour information. They merely record whether they hit any opaque object along their path back to the point light source. If they don't, that sample is lit. Otherwise, that light is ignored and the sample is treated as 'occluded' or in shadow.

unrealistic because it's pitch black, with no content. In real life, of course, you can still see the scene lying within a shadow by light that's reflected off the ceiling, walls and other objects in the scene. And it isn't just the intensity of light that's reflected but its colour too, so a white object near a green

'This back-to-front, eye-first, ray-casting approach cuts out more than 99.9 percent of all the calculations and makes computer 3D rendering feasible.'

This is another step toward realism, but the resulting ray-traced shadow is far from convincing. Its edge is far too hard, with each pixel either fully lit or completely dark. Real shadows aren't pin-sharp, because the natural diffusion of light gives them a border (the 'penumbra') of partial shadow. To produce this softened effect, some 3D applications let you use area light sources, which are effectively distributed collections of point sources. Using a 10 x 10 area light, for example, would generate the desired soft shadow edge.

However, introducing area lights massively increases the number of shadow ray intersection tests required for each sample, and hence the rendering time. A much more common solution is to move beyond pure ray tracing, to a process known as shadow mapping. First, the view from each light source is recorded as a greyscale shadow map including depth information of all objects and areas that are lit by that light. The rendering engine can then refer to this map to see if each sample should be lit or shadowed, and also to soften the effect near each shadow's edge. The result is more realistic soft shadows, generated far faster than ray-traced hard shadows.

Using area lights or shadow mapping, you can more or less accurately reproduce the shadow's soft edge, but the shadow itself still looks completely

wall takes on a greenish hue (and vice versa). To produce a realistic rendering, this indirect lighting has to be handled too. Within a ray-tracing renderer, the simplest workaround is to just add a constant ambient light factor – however, this is a crude approximation of the varying intensities and colours of real-world indirect lighting and has the undesirable effect of flattening out the image.

GI and Radiosity

For many years, the best practical solution was to manually fake this effect of natural indirect lighting by inserting a customised lighting setup with multiple light sources of varied intensity and colour. It's a laborious job that demands huge skill, and even then the result is still only a crude approximation of the subtleties of real-world indirect lighting. Clearly, there has to be a better way, which recognises that real-world objects aren't lit only by direct light sources but by light that's constantly being reflected onto them from surrounding objects. In other words, 'diffuse reflection' is the norm not the exception, and every surface in the scene needs to be treated as a light source.

The various methods for taking indirect lighting into account during rendering are labelled with the overriding title of global illumination

(GI). The best-known GI approach is a forward-working, source-to-eye algorithm called radiosity. Effectively, this works by breaking a scene down into representative patches and then recording how much light arrives at each patch from all parts of the scene that are visible to it. This light is then reflected back out into the scene and used as the basis for a second pass and so on. Eventually, after multiple passes, the radiosity process converges on a solution. Realistic under-table shadows at last!

Radiosity is ideal for indoor scenes, where most of the lighting is indirect and where ray tracing copes badly, but it's intrinsically slow and copes poorly with transparency and non-diffuse reflections (where ray tracing excels). To get the best of both worlds, we really want to be able to graft some indirect light handling onto the existing eye-to-source ray-tracing model. That's precisely what a GI system often referred to as Monte Carlo offers (the name is applied to algorithms involving a random element). This extension to ray tracing involves shooting yet more intersection-seeking secondary rays from the original ray cast sample, then using their fed-back values to colour the final pixel. However, unlike shadow rays that look for a simple sighting of a limited number of point light sources, we'd really like to measure the indirect light coming into every sample from the nearest point in every direction, then repeat this whole process to find the indirect light coming into those points and so on!

Of course, this simply isn't feasible, so compromises have to be made that trade off accuracy for speed. To begin with, only a small percentage of samples are checked. These GI samples aren't picked completely at random but rather are focused where they're most needed, in areas of strong contrast and wherever surfaces meet. Most importantly, indirect lighting rays



▲ Radiosity is particularly effective for indoor scenes with restricted lighting.

aren't sent out in all directions. Instead a limited number (300 is a good place to start) get sent out randomly in a dome shape. Further sprays of such random 'stochastic samples' are then sent out from where they first land, usually limited to a ray depth of three, or until some lower input threshold is reached. All this indirect lighting information is then propagated back for each GI sample, and these values are interpolated across the scene as a whole. Once this GI pass has finished, normal ray tracing begins, but with a varying indirect lighting

for the sky dome, the scene is both surrounded and indirectly illuminated by a bitmap in which each pixel corresponds linearly to the light levels in the original scene. Once this is set up, you often only have to add one direct light source to replicate the sun, or may even get away without any. Better still, IBL enables the lighting of a computer-generated 3D model to be accurately mapped onto a real-world scene, and the results really have to be seen to be believed.

IBL isn't just useful for outdoor scenes. It can be just as effective for indoor work. In fact, the HDRJ doesn't even have to match the current scene. If you hide the image itself and just use it as indirect illumination, it's worth experimenting with multiple light probes to see just what effects can be produced. There's nothing to stop you rendering a model of your desk as if it were illuminated by Westminster Abbey.

With GI and IBL, ray tracing can be extended to tackle the crucial task of rendering indirect illumination, but there's

a huge downside. Ray tracing is already a massively complicated and computationally intensive process, but adding GI to the mix dramatically increases the number of intersection tests and lighting calculations. Forget about putting the kettle on,

▲ GI handling can also be used by naturalistic outdoor scene renderers.

factor added to the calculation for each pixel's final colour value.

The result can't compete with multiple-path radiosity for scenes where indirect lighting dominates, and the random element of the process usually imparts a certain graininess. But by providing an ambient light factor that varies in intensity and colour for each sample, it offers far better realism than a simple ray trace with only direct lighting. The softer shadows and diffuse colour reflections offered by GI might not be consciously registered by the viewer, but the results just look more natural.

However, this GI approach doesn't work equally well for all scenes. In particular, for scenes without surrounding objects (particularly walls, floors and ceilings) most GI rays will just exit without sending back any indirect lighting information, which isn't just unhelpful but unrealistic, since in reality indirect lighting will always be coming from every angle, even when outdoors. The solution is to surround such a scene with a 'sky dome' so that every stochastic sample ray makes a contribution. Naturally, sky domes are a GI feature that proves particularly important for dedicated outdoor scene renderers, where each sampled point in the realistic atmosphere can act as an indirect light source that varies in colour and intensity.

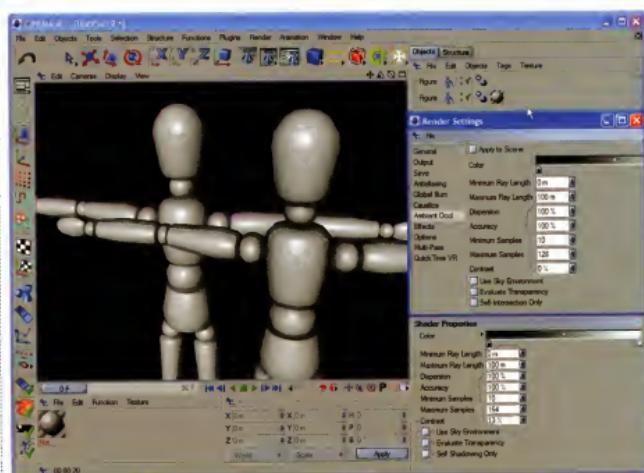
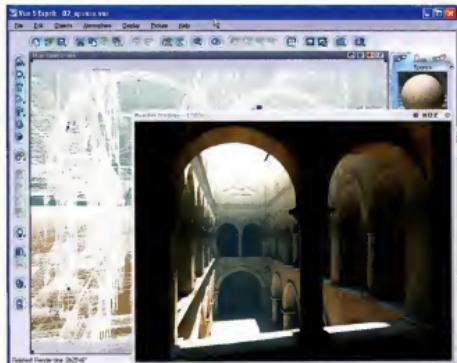
Tied in with the use of sky domes is another important GI technology called image based lighting (IBL). By specifying a special omnidirectional high dynamic range image (HDRJ) called a 'light probe' as a luminance texture map

get into your pyjamas (or even book a weekend break). On the upside, a GI solution can be saved and re-used if the indirect lighting in the scene hasn't changed, and the indirect lighting can even be 'baked' into a texture map where appropriate, to speed up future renders and especially animation. Even with current computer power, GI shouldn't be undertaken lightly.

That's where another ray-tracing extension comes in called ambient occlusion (AO). Rather than working out indirect lighting as GI does, AO works out indirect shadowing or occlusion, again by shooting out a random hemispherical spray of stochastic samples and seeing if they hit anything. Unlike GI rays, AO rays don't need to find the nearest intersection or perform multiple passes. Like shadow rays, they just need to know whether that ray is occluded, ideally within a set distance or ray length. There's also no need for complex colour and lighting calculations, as the sample can be simply shaded based on its ratio of occluded to non-occluded rays, and to speed things up further still, you don't need to process AO globally across the whole scene but can apply it as a shader to selected objects.

The result of applying ambient occlusion is that corners, holes, cracks and spaces between close objects appear darkened as in real life, admittedly with none of the diffuse colour reflection offered by GI, but with a soft shading effect that's very realistic and natural.

That's why AO is usually presented as a speedier, more practical alternative, but there's no reason why you shouldn't combine GI with AO for better end quality. In fact, with ray casting, subpixel anti-aliasing, ray tracing, reflection rays, refraction rays, shadow rays, area lights, shadow maps, GI, IBL and AO all working together, we've finally got the foundations in place for some seriously impressive rendering. Just don't expect to do it in real-time.



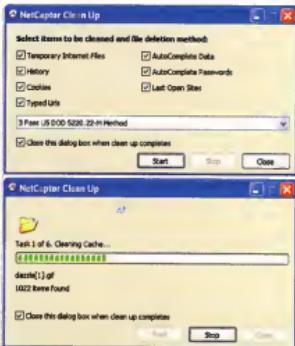
▲ Ambient occlusion produces more natural soft shadows.

Web of deceit

The Web is a bastion of convenience and data, but it lets others trace your steps and abuse your identity. **PC Authority** shows you how to stay safe.

1 Think before you post

Unlike in the 'real world' where the unguarded remarks you make in the pub late at night are as quickly forgotten by everyone else as they are by you, your online postings are not. Check the Wayback Machine (www.archive.org) for web pages you thought were long gone, or have a look at Google Groups (<http://groups.google.com>) for every newsgroup posting you've ever made. In both cases, there are routes to remove postings from their archives, but there will still be a copy somewhere. The moral of this story being, don't post personal data online, because it's wickedly easy to uncover if you know where and how to look.



▲ Automatic digital footprint deletion, to military standards, makes NetCaptor a compelling choice.

2 Type all URLs

Never click on links in an email message even if it appears to genuinely be from PayPal, eBay or your bank. It's too easy to obscure the real URL, so always fire up your browser of choice and log in to the site in question as normal, typing the URL in manually.

3 Clean your clicktrail

A web browser keeps detailed logs of your every online move. Cookies, cache, history, URLs entered and even files transferred are all recorded. It all combines to form your clicktrail, and anyone who gets access to your browser can retrace your tracks. NetCaptor (www.netcaptor.com) is a web browser that cleans up its own mess every time you close it, deleting the evidence using military-grade secure erasing techniques.

4 Don't get phish pharmed

You don't need to click on anything to get conned by pharming. DNS servers can be tampered with to redirect your typed-in URL to a different website where your password can be harvested. Install an anti-pharming device such as the Netcraft Toolbar (www.netcraft.com), which displays the actual country hosting the site you're visiting based upon IP address and not DNS, along with a fraud rating. If National Australia Bank has upped and moved to Russia then it's best not to proceed. The SpoofStick anti-phishing toolbar (www.corestreet.com/spoofstick) unravels those long and complex URLs to display the 'real' URL of the site you're visiting.

5 Payment protection

Only use secure websites when submitting credit card payment details. This is an obvious piece of advice perhaps, but it's not always clear which sites are secure. Look to the address bar for a URL starting with https:// instead of just http:// and double-check that the Padlock icon in the bottom right corner of your chosen browser client is snapped shut.

6 Dialog box fatigue

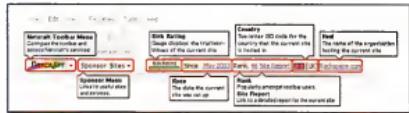
With so many pop-up dialog boxes asking if you agree to terms and conditions, it's hardly surprising that fatigue sets in and you become accustomed to just clicking 'yes'. This is a big mistake. Rogue diallers have been able to succeed because before they connect you to some foreign land at premium rates and stuff your computer full of spyware, they actually ask your permission.

7 Disable auto-complete

Internet Explorer stores all the details you enter in online forms so it can fill them in automatically for you in future. That's all very well, but if someone else uses your computer they get automatic access to your data. Go to Tools | Internet Options | Content | AutoComplete and uncheck everything. While you're there you may as well clear both the form and passwords stores.

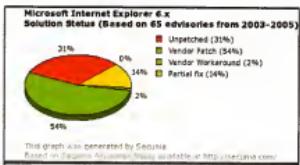
8 Dump Internet Explorer

As the world's dominant web browser, Internet Explorer understandably gets more attention from hackers than any other browser. Secunia



▲ Although it's such a simple addition to your browser, the Netcraft Toolbar packs a vital punch against pharming.

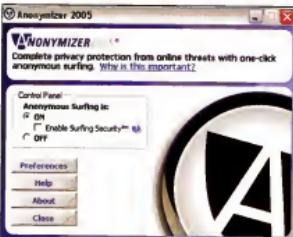
(<http://secunia.com>) keeps tabs on all browsers, and IE has racked up an astonishing 20 out of 81 security advisories that are marked as still being unpatched. This is one of the reasons why so many people have switched to a different browser, such as Firefox (five of 18 unpatched advisories) or Opera (no advisories). You should seriously consider doing the same.



▲ It's clear to see why Internet Explorer is such a target for hackers.

9 Browse anonymously

Wherever you go online, your IP address goes with you – it's a fundamental part of how the Internet works. Every site you visit knows you've been there because you leave behind a virtual footprint, unless you put a proxy server between them and you. You can make this happen by using services from Guardster (www.guardster.com) or Anonymizer (www.anonymizer.com). Instead of your IP address, it's the proxy server that gets noted, allowing you to surf in secrecy.



▲ One click is all it takes to browse in relative anonymity.

Jargon Buster: HDTV

Ready for the next generation of televisions?
Talk the talk with **PC Authority's** jargon guide.

Anamorphic

A method of squeezing the left and right sides of a widescreen image to fill the screen. If you viewed an anamorphic image in its raw form on a 4:3 screen, it will appear vertically stretched, but when outputted in its intended widescreen format, it will display in its intended format. DVDs that store a movie using anamorphic techniques will use a stored 'stretched' 4:3 image, which will then be 'unstretched' when played back on a widescreen 16:9 display.

Aspect ratio

This refers to the height and width of an image. The standard widescreen format used in HDTV is 16:9, while ordinary televisions and computer monitors use 4:3. Cinema aspect ratios can go up to 2.39:1.

Compression

Raw digital video footage requires a very large amount of storage and bandwidth. To get around this, video is compressed in a way that reduces the size of individual frames (similar to JPEG, GIF and other image compression types). In addition, the differences between frames can be recorded, rather than the individual frames themselves. For example, a sequence showing a plane flying against a blue background would result in only information about the position of the plane being noted. Different compression types can alter the quality and are often (but not always) the resulting trade-off between maintaining quality and reducing file size.

CRT

Despite being the most common type of TV or monitor, cathode ray tube units will likely phase out quickly among HDTV LCDs, plasmas, rear-projection and projectors. CRTs still hold one advantage, however, where they can maintain a good quality image regardless of resolution. LCD panels must convert a signal into the screen's native resolution, which can have varying effects on image quality.

DLP

Digital Light Processing is a technology used in projectors and projection televisions. Images are created by light that is reflected off thousands of tiny mirrors – one mirror for each pixel – sitting on top of a Digital Micromirror Device (DMD). In single DLP units, a spinning colour wheel sits between the mirrors and the light source to create the RGB image. Triple DLP models use individual DMDs for each colour.

DTV

Digital TV is a broad label given to any television broadcast carried in digital form. This allows for multiple channels, data transmission, and high definition TV. Its digital mode also frees from common analogue reception problems like ghosting, but also makes it susceptible to compression artifacts found in other compressed video signals.

Additionally, unlike analogue signals that get weaker at the fringes of reception, digital broadcasts are either on or off. That is, you'll receive a clearer image than analogue, but if the signal weakens you won't receive anything at all. That said, the advantages of DTV are far more significant than analogue, and Australian broadcasters are currently mandated to switch to DTV from the end of 2008.

HDTV

High definition TV (or video) commonly refers to digital video modes higher than SDTV, and typically falls under the 720p and 1080i types. The two modes are referred to according to the horizontal lines in the video signal, as well as the mode with which the frames are drawn on the screen. In these instances, 720p refers to a 16:9 widescreen signal with a resolution of 1280 x 720, with each frame displayed individually (or progressively) on the screen. 1080i refers to the same 16:9 aspect ratio, but displayed at 1920 x 1080 resolution using an interlaced method (odd and even lines are alternately displayed very quickly). The highest HDTV mode is 1080p, however there are few screens that can achieve this. When purchasing a HDTV, ignore claims that a unit is 'HD ready', 'HD enhanced' or 'HD compatible'. Sometimes, these screens simply receive the HDTV signal and downscale it to fit onto the screen. Always look for the native resolution to find if you truly have a TV capable of displaying the full signal.

LCD TV

LCD TVs are falling in price and increasing in size every year. Like LCD monitors, they have a fixed or native resolution, which represents the ideal resolution to display the picture on



▲ LCD TVs are plummeting in price and increasing in size.

the screen. LCD TVs consume less space and energy than CRTs, but on average offer a lower contrast ratio compared to CRTs and plasmas. Like LCD monitors, they can also suffer from dead pixels. LCD technology is also found in projectors and rear projection TVs.

Plasma

Plasma screens have been around for decades and, prior to LCD TVs, were the de facto luxury thin panel display. Plasma screens can be produced in very large sizes, are bright, and have a relatively high contrast ratio. However, the flip side is they can suffer from dead pixels and 'burn in', the latter being a left over visual artifact from a static image on the screen, like a television channel's logo in the bottom corner.

Rear projection TV

Rear projection TVs are mostly HDTV compatible. They work by using a built-in projector to display the image on the rear of the screen. Traditionally, RPTVs have been bulky and poor quality, however recent advances have seen the size decrease significantly, with better image quality. LCD and DLP projectors have largely replaced the old CRT projectors, which have contributed significantly to the improvements. As with ordinary projectors, lamp life is a serious consideration and you may need to fork out several hundreds of dollars periodically to keep it running.

BootVis and bithead

Jon Honeyball discovers a new Windows tool that lets you analyse your machine with precision.

One of the new features Windows XP introduced was the ability for the operating system to record how fast it was at booting, then to optimise itself to boot faster. It does this by measuring the times taken to load all the device drivers and initialise them, then working out all their dependencies. By doing this big calculation, it's possible to shuffle drivers around in the boot order to make the process complete quicker.

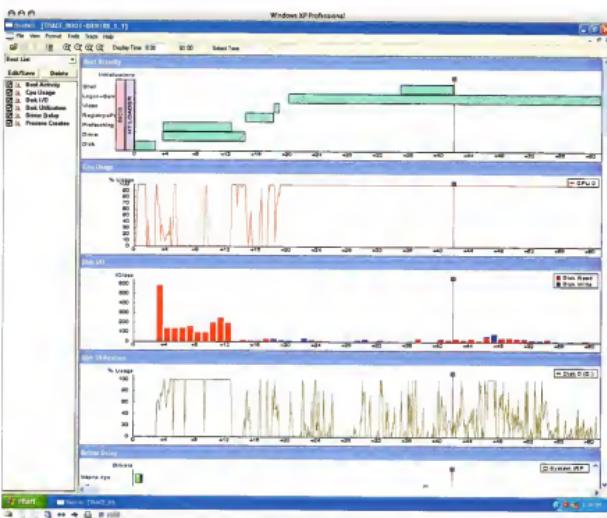
How XP achieves this, and how often, has so far been something of a mystery. We knew that the first few boots of a fresh XP system performed such optimisation, but it wasn't clear what happened after that. Did it ever run again automatically and, if so, how often?

Well, BootVis is a tool from Microsoft that allows you to see exactly what's going on. When you first run BootVis, you'll need to acquire some data, so choose File | New | Next Boot+Drivers Trace to make it collect all the information, then do a reboot and restart and wait for BootVis to automatically load the results. You get a lot of information from BootVis once it's done an analysis run. There's a set of horizontal time-based graphs, and each one focuses on a specific area of your system.

The first graph is an overall block diagram, giving you a bird's-eye view of the boot process. The next graph is of CPU usage, and as you'd expect this graph clangs around between idling and 100 percent, depending on whether it's waiting for the disk to complete a read.

Then come the Disk I/O and Disk Utilization graphs that indicate the amount of disk work that's happening. Lastly, you get Driver Delay, indicating how much waiting time there is, and a graphical view of Process Creation, which shows when it is in the sequence that services and applications load up.

I have a session running here in a Virtual PC (I prefer that when testing such boot-time applications, so it doesn't matter if everything goes horribly wrong). It shows that first the BIOS does its work, then the NT boot loader takes over and the OS goes into its proper boot sequence, starting with about two seconds of disk IO, during which the very core of XP gets loaded – the kernel, the memory management code and so forth. There's a brief gap of around a second or so, during which the memory and basic hardware on the motherboard are checked out, then the loading sequence starts in earnest, consisting of some 12 seconds of driver loading and 10 seconds of driver pre-fetching. Once this is complete, the Registry is loaded and then the video driver system. Finally, the login and server services are started up, beginning at about 20 seconds, with shell initialisation happening at around 35 seconds.



► BootVis opens up a whole world of insight into how your computer is booting - well worth a try.

These figures are slowish because I'm running XP in a Virtual PC environment, but it demonstrates just how processor-intensive the boot sequence is and that, after the initial blast load of all the drivers and pre-fetch, disk speed doesn't matter all that much.

There's an option on the Trace menu to optimise the system, so I selected this and the system automatically rebooted to do some more work. With the reboot over, a dialog box came up telling me it was optimising the system. 'Please wait while the boot files are laid out on the disk for faster system startup. This operation might take several minutes.'

Is this all worthwhile? It's clear that BootVis is an interesting tool that tells you a lot about how your machine is actually starting up, where the bottlenecks are and so on (and it can tell you this to suspend/hibernate too). From an educational point of view, it's definitely something worth trying, but whether it's worth running everyday is an entirely different matter. Microsoft has pulled BootVis off its website, saying that XP does all the necessary optimisations every few days and that BootVis adds nothing to the party.

Whether this is the whole truth behind its removal is hard to judge. It's possible that a tool such as BootVis could occasionally get things so

wrong you'd end up with an unbootable system, in which case putting it in the hands of the public wouldn't be terribly wise. Nevertheless, you're all seasoned IT professionals who shrug your shoulders at the prospect of an unbootable machine — that's what your tried-and-tested disaster-recovery solution is for, isn't it?

Obviously then, I have no compunction about recommending that the power users among you ignore Microsoft's warnings and take an interesting poke around the innards of XP using BootVis. A quick web search will locate a download site holding the file, even if you can no longer get it from Microsoft. As for whether XP really does the work of BootVis all by itself, and silently too, this is something I find hard to believe. I don't recall XP ever telling me that it was reorganising things on the disk and to wait several minutes.

AV integration with Security Center

I've been looking at some anti-virus applications recently, and I'm a little concerned that several of them have an unhealthy desire to shut down the XP Security Center and take over its workload themselves, replacing Security Center with their own application. While I'd have no problem with a *standalone writing a better Security Center* for

their own application support needs, I can't help feeling that this might be two steps forward and one step backwards. I think I'd be happier leaving the Security Center in place and making the AV/Firewall application work properly within the new security framework that Microsoft has provided. How can I be sure that some third-party vendor has implemented everything I need? I can't, and it's hard to tell by poking them with a pointy stick.

This reminds me a little of the early days of Windows printing, when some vendors decided to ignore the new printing subsystem and install their own attempt. Some of these were reasonable, but some were so dire it didn't

putting a rootkit application onto a music CD. The news came to me from the excellent www.sysinternals.com website, where Mark Russinovich pontificates on the very advanced, deep and dirty parts of Windows. I've recommended this site many times before for its excellent utilities and tools, many of which are clearly best of breed.

So it was with some shock that I read how Sony BMG had stooped to unimaginable levels of irresponsibility when putting a new type of copy protection onto a music CD to prevent you from ripping it. If you attempt to play this disc on a Windows machine, it will insist you install a special Sony media player that lets you listen to pre-ripped tracks, which also enforces

on-the-fly to hide its tracks. It does this by naming its files to start with \$sys\$, then patching the OS so that any file, driver, application or memory process starting with \$sys\$ is rendered invisible. That means it's gone, you can't see it, and even your AV product can't locate it, which makes it the perfect place for some malfeasor to hide a trojan or other nasty on your system – just name the file \$sys\$nastybomber.exe and the user will have no idea it's there, running in the background.

Worse still, there's no uninstaller for this horror, and attempts by Mark to dig it out of his system ended up by breaking the system. (Did I mention that Sony makes this nonsense work even in Safe mode, so you can't dig it out that way?) I'm totally appalled at this and I absolutely won't allow such behaviour anywhere near any machine I own.

Naturally, you can get around the whole issue by ripping the album on some other platform such as a Mac or a Linux box, and I understand that the title in question is happily being traded on the file-sharing peer-to-peer networks in this way. So here you have a DRM solution that screws up the Windows systems of its honest users, while doing nothing to prevent the dishonest from illegitimately copying it. Well done, Sony, you should be ashamed of yourself for this one.

I note, as I type these words, that Sony has now backed down by releasing a patch that stops the \$sys\$ cloaking, a pathetically small step in the right direction that's nowhere near enough. I'm sure Akio Morita would be appalled and is spinning in his grave.

'So here you have a DRM system that screws up the Windows systems of honest users.'

take long for them to realise the folly of their ways and fall into line by using the then new Microsoft frameworks. I wonder if the same thing is happening today – they tell you to use their application because they haven't got around to working cleanly with the XP SP 2 frameworks yet. Given that SP 2 is now nearly two years old, at least from a beta tester and coder's point of view, I wonder if sheer laziness is at work?

Sony Rootkit Rant

It's rare that I get really angry, but it happened this week over the controversy about Sony BMG

DRM (digital rights management) and won't let you copy the disc. I don't have any problem with properly thought-out DRM, provided it doesn't get in the way of my day-to-day work and pleasure – iTunes Music Store works very well for me, although I'd be less happy if I used, for example, the most excellent Roku media extenders because these can't play ITMS-encrypted material.

But Sony has gone way, way too far. Its new media player and DRM solution installs a rootkit application deep into the guts of your Windows installation, then patches the OS in memory

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Host at home

Leigh Dyer shows you how to host websites at home for fun and profit.

Thanks to iiNet's recent installation of a DSLAM at my telephone exchange, my home ADSL connection is now running free of Telstra's ADSL hardware. Instead of being limited to 1.5Mb/s, I can now get the full 8Mb/s that my modem and phone line can handle. My upload speed has improved too, from a poor 256Kb/s to an impressive 1Mb/s, so I can now push content out almost as quickly as my friends can download it. With that much bandwidth to play with, I just have to do some hosting.

Even if you don't have a super speedy ADSL line, hosting your personal websites at home can work very well, especially if they're generally low traffic. Not only do you save a little cash on hosting fees, but you gain the flexibility to install and run whatever web serving or application software you like, rather than shopping around for providers that offer what you prefer to use.

Setting up the web server itself is only part of the solution though – we'll look at some tricks to make it as easy as possible for users to get on to your site, and to keep your connection running smoothly with all that extra traffic.

SERVER SOFTWARE OPTIONS

Apache, which runs almost 70 percent of the world's websites, would have to be the obvious choice for your home web server. It's not a terribly small application (though it's not huge either), and it can be complex to configure at times, but it's reasonably quick, quite stable, and is extremely flexible. It's also fairly easy to get

▼ LightTPD even has nice CSS-styled directory listing pages

started with, thanks to distribution packages that ship it pre-configured and ready to run.

On a Debian or Ubuntu system, you can install Apache 2.0 with apt:

sudo apt-get install apache2

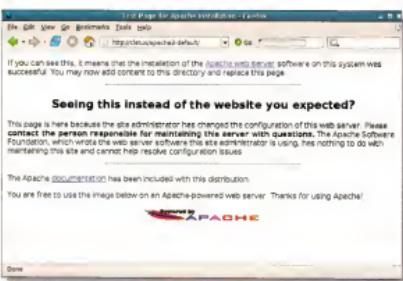
It should start as soon as it's installed, and automatically configure itself to run on system startup. It's pre-configured to run on the standard port 80, and it serves files out of /var/www. Dozens of add-on modules, such as PHP, can be easily installed and automatically configured through apt as well.

If you're running a small system, and Apache seems like overkill, you might want to try a lightweight web server like LightTPD (www.lighttpd.net). It's small, very fast and efficient, and has a fairly impressive set of features. It doesn't support plug-in modules for extensions like PHP, but

it can run scripts through more traditional methods like CGI. It also implements FastCGI, which lets you run external scripts without the overhead of launching a new interpreter for each request. The developers claim that LightTPD running PHP with FastCGI is just as

fast as Apache running with its PHP module.

Once you've installed your web server, you need to make it accessible to the outside world. If you run a Linux gateway, and you've installed the web server on that, then you should be good to go as long as your firewall allows incoming access to port 80. If you have a dedicated ADSL router, you'll have to check the manual to see how to configure it to forward



▲ Pre-configured distribution packages make Apache a breeze to install.

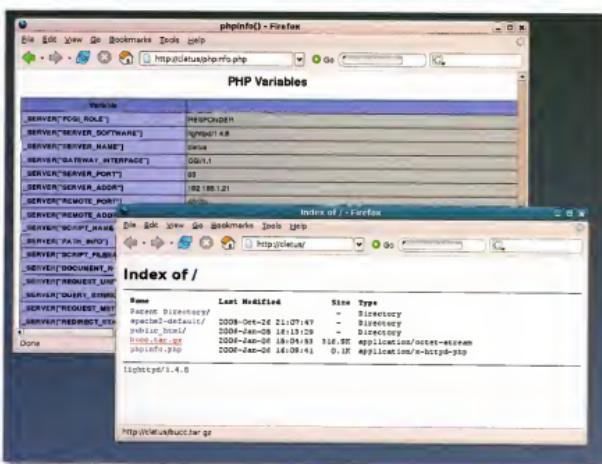
requests on port 80 through to your web server, though it's usually quite straightforward. You might also need to look in to any port blocking that your ISP might do. Many ISPs block a number of incoming ports, including 80, though some (including iiNet) let you disable this. Remember, too, that you may be breaching the Acceptable Use Policy of your ISP, so be sure to check.

With that done, external users should be able to access your web server by typing your IP address in to their browsers.

MASTER OF YOUR DOMAIN

No-one likes to type in IP addresses though, so you'll really need to get yourself a domain. There's one slight snag to this though – most home ADSL connections don't have a static IP address, so the IP address of your connection can change each time you connect. Some ISPs offer reasonably priced static IP plans, but if yours doesn't, you can still register a domain, though you'll have to pay for DNS hosting, and you'll also need to update your IP address manually whenever it changes.

A cheaper and easier option is to use a dynamic DNS service, like the one offered at <http://dyndns.org>. Instead of registering your own domain, these services give you a subdomain on their already established domain. It may not be quite as nice as having your own domain name, but these services are often free, and they save a lot of hassle.



Once you've registered a subdomain on a site like dyndns.org, you can log in to your account through your browser to update your IP address. Alternatively, you can run an automated process that checks for changes to your IP address and automatically submits them for you. Some ADSL routers have this kind of functionality built-in, with support for a number of the popular dynamic DNS providers, though on a Linux system you can download a script like ipcheck (<http://ipcheck.sourceforge.net/>). With some option-tweaking, you can even run ipcheck on a PC behind an ADSL router that doesn't have dynamic DNS support – it can parse the status pages on various routers to determine your IP address.

THE SHAPE OF THINGS TO COME

Traffic shaping is best known for its use by ISPs when you go over your download quota for the month, but you can also apply it to your server. With the right kernel modules and tools installed, you can use traffic shaping on your Linux web server to limit the bandwidth available to your clients, ensuring that there's plenty left over for your own needs.

I'll assume that most of you are running a standard distribution kernel that ships with the traffic shaper modules, and I'll also assume that if you're clever enough to build your own kernel, you can handle rebuilding it with the appropriate options enabled. The only other requirement is the 'tc' command, which ships as part of the iproute package.

Traffic shaping is one of those real mind-benders, but it's not too tricky to set up some bandwidth limits for a web server. The basic principles involve setting up control classes for different kinds of traffic, and then configuring filter rules to assign traffic into the appropriate classes. There are many traffic control classes available, from simple fixed rate limiters and more complex prioritisers, through to hierarchical rate limiters that can divide available bandwidth between multiple services.

For our web server, a simple setup of the hierarchical rate limiter is a good option. I've configured a top-level class that sets the total available bandwidth on my link (1000Kb/s), and under that I've created a 200Kb/s class for web serving, and a 800Kb/s class for all other traffic. These classes can also borrow traffic from each other – I've allowed web traffic to take up to an extra 100Kb/s from my general upload traffic, or if no one is using the web server, my regular uploading can borrow its 200Kb/s of bandwidth as needed as well.

Run these commands to delete any existing traffic shaping, and create our new shaper. Modify the network interface and bandwidth figures involved to match your needs:

```
sudo tc qdisc del dev eth0 root
sudo tc qdisc add dev eth0 root handle 1: htb default 11
sudo tc class add dev eth0 parent 1: classid 1:1 htb rate 1000Kbit
```

```
lsd@pletus:~$ sudo tc -s -d class show dev eth0
class htb 1:1 parent 1:1 prio 0 quantum 11250 rate 90000bit ceil 10000bit burs
t 2Kb/8 mpu 0b overhead 0b burst 2099b/8 mpu 0b overhead 0b level 0
Sent 59442/3066 bytes 5731147 pkts (dropped 0, overlimits 0)
rate 43236bit 49bps
lended: 5363581 borrowed: 367566 giants: 0
tokens: -5057 ctokens: -3734

class htb 1:10 parent 1:1 prio 0 quantum 1250 rate 100000bit ceil 200000bit burs
t 16Kb/8 mpu 0b overhead 0b burst 1864b/8 mpu 0b overhead 0b level 0
Sent 13075884 bytes 8564 pkts (dropped 0, overlimits 0)
lended: 4337 borrowed: 4307 giants: 0
tokens: 129526 ctokens: 67011

class htb 1:11 parent 1:10 prio 0 quantum 1250 rate 100000bit ceil 200000bit burs
t 16Kb/8 mpu 0b overhead 0b burst 1864b/8 mpu 0b overhead 0b level 0
Sent 5957349750 bytes 5739791 pkts (dropped 0, overlimits 0)
rate 43236bit 49bps
lended: 371873 borrowed: 0 giants: 0
tokens: -3734 ctokens: -3734

lsd@pletus:~$
```

▲ The tc command can give you a lot of info on how your shaper is running.

```
sudo tc class add dev eth0 parent 1:1
classid 1:10 htb rate 200Kbit ceil 300Kbit
sudo tc class add dev eth0 parent 1:1
classid 1:11 htb rate 800Kbit ceil 1000Kbit
```

With the shaper in place, we need to assign the outgoing web traffic to the 200Kbit class. The 'default 11' section on line two automatically puts any unclassified traffic in to the 800Kbit class. The best way to classify traffic is through Netfilter, using the CLASSIFY target to assign the appropriate shaper class ID:

```
sudo iptables -t mangle -A POSTROUTING
-o eth0 -p tcp --sport 80 -j CLASSIFY --set-class 1:10
```

Put all that in a handy little script and run it on startup to ensure that your web traffic is always shaped. To check the traffic flowing through your shaper, try this command:

```
sudo tc -s -d class show dev eth0
```

This all assumes that you're running a Linux router, but if you're not, you can run the shaper on your web server machine instead. You'll want to increase the link speed (to 100Mb/s for Ethernet, for instance) and similarly increase the speed for your default class. You can also configure the CLASSIFY rule to only shape web access coming from outside your LAN, keeping local browsing of your site snappy, by adding a "-d dest 192.168.1.0/24" clause or similar to the iptables command.

We've barely scratched the surface of traffic shaping. If you want to try something more sophisticated, have a read through the excellent guide at http://trekweb.com/~jasonb/articles/traffic_shaping/index.html.

Apache choices

Being the world's most popular web server isn't always easy. When the Apache project decided several years ago that they needed to make fundamental changes to the Apache codebase, they re-wrote the entire server from scratch. Those changes in Apache 2.0 have improved scalability and performance, and added some new features, but most web sites continue to run on 1.3.

Unfortunately, the upgrade to 2.0 has been fairly painful. Developers of add-on modules, like PHP, have had to rewrite their code to work with the new server, and this has taken a long time in some cases. Furthermore, there's simply no incentive for an upgrade for many users. Core changes aimed at improving performance, such as a new underlying API and threading system, help mainly on NT and Solaris, with lesser gains on Linux.

It's not really a problem that so many people continue to run Apache 1.3 though. Apache developers still support the 1.3 branch with security fixes, but even if they didn't, other developers could pick up the code and pitch in to keep it secure. This leaves users to upgrade on their own schedule. Apache 2.2 is now available with some interesting new features, and with most of the issues surrounding Apache 2 now resolved, it might be enough to entice more users to upgrade.

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GAMELABS

Post-Christmas playing, **Ben Mansill** has several games half-finished, and a couple that will never be finished.

BYTES

RATBAG SLIDES OUT

Adelaide-based developer Ratbag has closed down. The company made several successful racing games, including the wonderful Powerslide. Ratbag was purchased by Midway last year, but Midway, facing its own financial difficulties pulled the plug on 13 December. This leaves 70 employees out of work and ends one of Australia's gaming success stories.



DAMAGED GOODS

A 19MB 'patch' has been released for X3: The Reunion, covering several dozen incomplete gameplay elements. We reviewed X3 last month, giving it 2/6 stars. While the patch makes the game playable as advertised, it does nothing to overcome the diabolical interface, possibly the worst we've ever encountered.



GET PHYSICAL

AGEIA showed off a prototype of its PhysX card at the recent CES show in Las Vegas. The card is designed to handle realtime game physics, relieving the load currently placed on the CPU. Games will need to support the card for the benefits to be enjoyed. The PhysX card is expected to go on sale sometime in the first half of 2006.



When it's done?

We are regularly saddened to see incomplete games deliberately released, only to be patched up to completion a month or two later. It's been going on since the dawn of gaming and is a slap in the face to gamers every time.

It usually happens for one of two reasons. Most commonly a company wants to have its game on the shelves during a peak sales season, like Christmas. If the game is only 80 percent complete then buyer be damned, it's off to retail with a 'patch' making up the last 20 percent a little later. This is a con and shows no respect whatsoever for the customer as the 'game' is almost always buggy and unplayable.

Less frequently we see a game developer forced to ship an incomplete game because the company is in cash, with only a few days worth of cash in the bank and an incomplete game its only asset. So it's 'release and pray'.

Recent offenders include the much anticipated X3: The Reunion and the utterly shocker Boiling Point, which was simply unplayable. Big names aren't innocent either. The original Black and White was simply shoddy work. The infamous BattleCruiser series is more curious as a tech demo rather than any kind of actual game. Arguably the biggest disappointment was Falcon 4.0, which wasn't anything how it should have been straight out of the box. In fact, it's only now after many years that we've got the retail version we'd hoped for with Allied Forces.

All this is heartbreaking for the developers, who in many cases had invested years of toil and passion. No artist wants to unveil a half finished painting. Invariably it is pressure from above. Marketing managers are most often to blame, or greedy company owners.

PC Authority thinks little of these shenanigans. It is a waste of everybody's time and it's offensive. Follow-up patches to incomplete games are usually huge and dial-up unfriendly. Who is to assume that we gamers will religiously soldier on with a half-baked game, slaves to the patch release (if it ever comes)? Do they think we give that much of a toss about an unfinished, unplayable game to attentively visit its site regularly in hope that salvation is at hand? Do they really think we'll keep the faith and continue to buy products from a company that's already sold us a lemon?

So entrenched is this 'distribution model' that it happens several times a year. It's a heartbreak for customers and developers alike. Sadly, the smaller and more innovative developers see this happen more frequently than the big guns with money and resources. The irony is that if we want to see games that break moulds and innovate we're forced to accept this sorry state. Exasperating is the word we're looking for here.



▲ Originally released in 1998, Falcon 4.0 finally got finished in 2005 with the community-driven Allied Forces version.



Joint Task Force

DEVELOPER Epic WHEN 2007

WEB www.unrealtournament2007.com

There's a military commander in all of us, according to games developers. Every year we've served up a swag of strategy titles, ranging from the brutally difficult to the more forgiving and fantastical. At first glance, Joint Task Force appears to be little different from a lot of these games, but upon closer examination it seems as if it could be something special. Joint Task Force is a game that promises to deliver all of the intricacies of modern combat, from embedded reporters to soldiers sleeping down from helicopters.

In an interesting move, the tried and true resource collection system that is found in so many games is gone. Instead you'll be awarded cash for performing tasks such as rescuing people and minimising the amount of collateral damage you leave behind. Rather than pumping out units mid-battle, you'll have to bring them with you or get them through a supply drop.

Also, Joint Task Force will automatically group your forces depending on their type, rather than placing you in charge of a mob of individuals. Soldiers, for example, will form squads, which in turn will automatically guard more vulnerable units like snipers and mortar crews. If you've played Kohan or Warhammer: Dawn of War, you'll be right at home.

Expect to live out those Donald Rumsfeld fantasies some time around June.

Christopher Taylor



TimeShift

DEVELOPER Saber Interactive WHEN Q2 2006

WEB www.atari.com/us/games/timeshift/pc

No matter how many times you warm them, no matter how many times it all goes horribly wrong in movies, people still want to fool around with time travel.

That's the premise behind Saber Interactive's upcoming TimeShift, which places you in the shoes of a US Air Force test pilot sent back in time as part of an experiment. Upon his return to the present day, he finds himself faced with a world run by an evil George Orwell-style government that quickly pegs him as a threat to national security and sets about hunting him down.

Saber promise to deliver us some 35 lengthy missions that jump across multiple points in history. In a nice touch, the arsenal will change depending on the time period that you find yourself in and will include things ranging from simple pistols to plasma rifles.

Not only that, but you'll also be able to make use of your time travelling gear to slow down, stop and reverse time. Saber states that these abilities are more than mere gimmicks. Instead they assist the player in solving puzzles, navigating the game environment and combating enemies.

All in all, TimeShift looks very promising and could be huge considering that it's offering something new and will hit a long time after the big name releases of 2005.

Christopher Taylor





Splinter Cell: Double Agent

DEVELOPER Ubisoft **WHEN** Q1 2006
WEB www.splintercell.com

Ubisoft's upcoming Splinter Cell: Double Agent will see gamers once again take control of Sam Fisher, guiding him through secret military installations and helping him sneak into foreign embassies with an impressive array of tools and toys. What's different this time around however, is that Sam has become a double agent.

Whereas previous games in the series were reasonably straight forward action games, the concept behind Double Agent means you'll have to be even more cautious when you're snooping in places you're not supposed to be.

As the game progresses, Sam will not only have to work out what the terrorist organisation's evil plan is and how it can be stopped, but also go on missions for them in order to maintain his cover. Expect to make some complex moral decisions, often with no right or wrong answer being immediately apparent. The choices that you make will in turn influence the outcome of the plot. Whether this all actually works in practice remains to be seen.

Slated for a Q1 2006 release, expect not only a fresh take on singleplayer, but an improved multiplayer mode which allows you to play co-operatively or against each other in objective-based spy versus mercenary battles.

Christopher Taylor



Ghost Recon: Advanced Warfighter

DEVELOPER Ubisoft **WHEN** Q1 2006
WEB www.ghostrecon.com

Ghost Recon: Advanced Warfighter promises to give us a taste of modern urban combat and a chance to play with some of the most hi-tech military gear around, a lot of which is still being tested.

Advanced Warfighter transports you to 2013, at a time when civil and political unrest has broken out in Mexico. It's up to you and your elite group of US Army soldiers to take down the troublemakers and restore order. To help you in your task, you'll not only have access to a huge arsenal of guns and gadgets, but a new satellite system which allows you to command your troops, call in air strikes and scope out the battlefield with remote-controlled spy drones.

A lengthy singleplayer campaign gives you a chance to explore a great deal of Mexico City. In addition, a plethora of multiplayer options, including a specially designed co-operative campaign, lets you take the fight to the rebels with the assistance of your friends.

If the finished product turns out to be half as good as the previous games, Ghost Recon: Advanced Warfighter will be one very intense military experience.

Christopher Taylor





GT Legends

Originally intended as an add-on to the mighty GTR (reviewed August 2005, page 137 with a score of 6/6), developer Simbin decided mid-course to fully deck it out as a stand-alone game. Praise be that they did. GT Legends has all the strengths of GTR – namely an unbeatably sweet driving feel and lush graphics – with none of the icky bits – GTR was scarcely hard to master.

Pitched as an historical simulation, GT Legends lets you take some of the sexiest cars ever out for a hard thrash. It's structured as a proper game, meaning you'll need to play through a career to 'unlock' cars and tracks as you go. Some sim purists have issues with that, but it really does make it a more satisfying and complete experience as it is. You'll hit the track in a little Mini, move through the ranks of mid-range cars like the Mustang and 911, eventually graduating to drive supercars from the 60s and 70s like the fearsome and never modelled before Detomaso Pantera.

Where GTR asked that you memorise every centimetre of every track and mind-meld with the cars to clock up an incident-free lap, GT Legends is a little softer, a little friendlier. You can go hard and thrash the cars and still do a safe, fast and fun lap. It's very seat-of-the-pants driving which is extremely satisfying.

Being historical, many old tracks have been recreated for the game. They might be apartment blocks now, but these beautiful tracks live on in this wonderful game and it's a treat to drive around new tarmac for a change.

Needless to say a steering wheel is essential. If you're any kind of petrol head it's a must-buy.

Ben Mansill

REQUIREMENTS

1.3GHz CPU; 512MB RAM; DX 8.1 compatible graphics card.

SUPPLIER

PRICE \$49.95

► www.gt-legends.com

FOR

A different and immensely satisfying racer for any level of sim driver.

AGAINST

The promised '90 cars' is really a quarter of that number, in different configurations.

OVERALL



Harry Potter and the Goblet of Fire

Harry Potter, boy wizard turned saviour of children's literature, has been the subject of all sorts of merchandise, ranging from chocolate frogs to dubious vibrating broomsticks and, of course, video games. Based on the fourth book and film in the series, The Goblet of Fire is the latest in a string of mediocre titles branded with Warner Brothers' official seal of Potter.

As per the book and film of the same name, The Goblet of Fire centres around the Triwizard Tournament – a deadly competition made up of three different events involving things like stealing eggs from dragons. As either Harry, Ron or Hermione it's not only your responsibility to win the tournament, but to also engage in tasks such as collecting items and fighting off hordes of monsters that just so happen to be wandering around the school grounds.

Understandably, spell-casting forms a large part of the game. Managed through a context-sensitive system, it's simple, sweet and slick. It's also nice to see that when you're casting a difficult spell, your AI-controlled friends will rush over to help you out. You see, this is a game about friendship and co-operation.

The Goblet of Fire

is a typical movie-

inspired action game

– in other words

there's some passable

voice acting sprinkled

on a minimum

serving of fairly dull

gameplay, along with

an awful camera,

and AI that's often

daft. In short, this is

a title that's hard to

recommend to even

the most addicted

Potterhead.

Ben Mansill

REQUIREMENTS

1.2GHz CPU; 32MB DirectX 9 graphics;

256MB RAM,

SUPPLIER

PRICE \$89.95

► www.lionhead.com/themovies

FOR

Voice acting; spell-casting.

AGAINST

Dull gameplay, no replay value, stupid AI, annoying camera.

OVERALL



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The A-List

THE BEST OF THE BEST
IN 45 CATEGORIES.

TI's AMD dual-core beast didn't just win the Labs, it screamed right onto the A-List. Not enough to pip Scorp-tec's high-end machine, but its low price let it secure its place as the mid-range PC of choice. Also, the Albatron 6800 GS made a surprise entry this month after a tasty price drop increased its value.

The A-List



HOW IT WORKS:
All A-Listed products
are listed with the
cheapest price and
cheapest supplier.



Reviews Roundup

THE LATEST REVIEWS,
RANKED, AND RATED.

As much we'd like to, we can't do group tests on every product, every month. But that doesn't mean you can't get a comparison of all of our reviews. This section is your handy guide to the latest group tests and standalone reviews, ranked and ordered by our Labs team. This month, be sure to check out the new additions to our notebooks.

Reviews Roundup



HOW IT WORKS:
Prices listed in our
Reviews Roundup
show the price at the
time of review.

Products that come top of
our intensive Labs
group tests.

A great product that
excels in one, or
many, areas.



The A-LIST

★★★★★ Only the absolute best of the best make it to PC Authority's A-List.

VALUE PC

PCMarket SDS-G2 AMD Athlon64 GDCS



PRICE: \$1499

DELIVERY: \$44 to \$99

SUPPLIER: PC Market 02 9898 3055

INTERNET: www.pcmarket.com.au

ISSUE: January 2006, page 42.

VERDICT: If your budget is tight but you want a good all round system, then PC Market delivers. It sports a decent 17in LCD, good keyboard, mouse and speakers.

SPECIFICATIONS: 1.8GHz Athlon 64 3000+; 1GB PC3200 RAM; 160GB hard disk; Dual Layer DVD-RAM writer; Geforce overclocked 6600GT graphics; 17in CMV LCD; Ozaki 2.1 speakers; Windows XP Home; 1yr RTB warranty.

MID-RANGE PC

TI AMD Power 3000

NEW



PRICE: \$3025

DELIVERY: From \$25 to \$48

SUPPLIER: TI 02 9437 5437

INTERNET: www.ticomputers.com.au

ISSUE: March 2006, page 83

COMMENTS: There are no weak points with Trinity International's TI AMD Power 3000. 7800 GT graphics handles gaming, while a dual-core CPU, twin 250GB hard disks and 19in LCD round things off very nicely indeed.

SPECIFICATIONS: 2.26GHz AMD Athlon X2 4200+; 1GB PC3200 RAM; 500GB hard disk; Dual-layer DVD-RAM writer; DVD-RW; Geforce 7800 GT graphics; 19in BenQ LCD; Windows XP Home; 2yrs RTB warranty.

HIGH-END PC

Scorptec Stinger



PRICE: \$3900

DELIVERY: \$25 to \$85

SUPPLIER: Scorptec Technology Computers 1300 726 770

INTERNET: www.scorptec.com.au

ISSUE: December 2005, page 48

COMMENTS: A great package that offers excellent peripherals including a great 19in LCD. It's powerful and practically silent too. But pay \$150 more for the 3yrs on-site warranty.

SPECIFICATIONS: 2.2GHz Athlon 64 X2 4400+; 1GB PC3200 RAM; 500GB hard disk; Dual layer DVD-RAM writer; Dual layer DVD-writer; Geforce 7800GTX graphics; 19in Samsung LCD; Logitech 5.1 speakers; Windows XP Pro; 1yr RTB.



'A very powerful system with little in the way of weak points.'

MEDIA CENTER PC

Enspire AVR-200



PRICE: \$1699

DELIVERY: \$15 to \$30

SUPPLIER: Enspire Digital 1300 880 070

INTERNET: www.enspiredigital.com.au

ISSUE: January 2006, page 43.

COMMENTS: Coming in at over \$1000 less than the competition, this is whisper quiet, looks fantastic, and is only 108mm high. Throw in two digital HD tuners and it's a bargain.

SPECIFICATIONS: 1.8GHz Athlon X2 4200+; 512MB PC3200 RAM; 200GB hard disk; Dual-layer DVD writer; 2 HDTV digital tuners; 802.11a/b/g WLAN; MCE remote; Windows XP Media Center Edition; 1yr onsite warranty.

BUSINESS PC

Dell Optiplex GX620 USF



PRICE: \$1439

DELIVERY: Free

SUPPLIER: Dell 1800 812 393

INTERNET: www.dell.com.au

ISSUE: October 2005, page 57.

COMMENTS: This incredibly compact PC can even bolt to the back of a LCD (the one pictured isn't included in the price), yet still includes a powerful 3GHz Pentium 4 processor.

SPECIFICATIONS: 3GHz Pentium 4 531; 512MB PC3200 RAM; Intel 945G Express chipset; 80GB HD; combo CD-RW/DVD-RW; Gigabit Ethernet; 7 x USB 2.0; DVI with VGA; Windows XP Pro; 3yr on-site; 89 x 266 x 264mm (WDH).

ULTRAPORTABLE NOTEBOOK

Dell Latitude D410



PRICE: \$3326

DELIVERY: Free

SUPPLIER: Dell 1800 812 393

INTERNET: www.dell.com.au

ISSUE: November 2005, page 44

COMMENTS: At 1.95kg, the D410 is very portable and will last too. With a 2GHz Pentium M processor it also packs a powerful punch when used as a main system.

SPECIFICATIONS: 2GHz Pentium M 760; 1GB RAM; 60GB HDD; 8X DVD writer; Intel GMA900 graphics; 12.1-in 1024 x 768 LCD; Blueooth; 802.11a/b/g WLAN; Media Slice; Windows XP Pro; 3yr on-site warranty; 1.95kg.

BUSINESS NOTEBOOK

Dell Latitude D610



PRICE: \$2713

DELIVERY: Free

SUPPLIER: Dell 1800 812 393

INTERNET: www.dell.com.au

ISSUE: September 2005, page 38

COMMENTS: With updated Centrino inside, the Latitude D610 is a forward-looking business notebook. Highly configurable, and perfect for business.

SPECIFICATIONS: 2GHz Intel Pentium M 755; 512MB PC4300 00R2 RAM; 80GB HDD; combo 0V0/CD-RW; Intel GMA900 graphics; 14.1-inch 1400 X 950 LCD; 802.11b/g WLAN; Windows XP Pro; 3yr on-site NBO warranty; 2.5kg.

DESKTOP REPLACEMENT

Acer Aspire 9504WSMI NEW



PRICE: \$3249

DELIVERY: Free

SUPPLIER: Digitalcityonline

INTERNET: www.digitalcityonline.com.au

ISSUE: March 2006, page 56

COMMENTS: A solidly built laptop with plenty of entertainment features - including an integrated digital TV tuner - and a bright clear 17in widescreen display. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 2GHz Pentium M 760; 1GB PC4300 RAM; 100GB HDD; Dual layer DVD Writer; Mobility Radeon X700 graphics; 17in 1440 x 900 LCD; Blueooth; 802.11b/g WLAN; Windows XP Home; 1yr CGR warranty; 802.11b/g WLAN; Windows XP Home; 1yr CGR warranty.

VALUE NOTEBOOK

Compaq Presario V2340AP



PRICE: \$1099

DELIVERY: \$20

SUPPLIER: www.pc.net.auINTERNET: www.hp.com.au

ISSUE: January 2006, page 38

COMMENTS: It might not offer power for hardcore encoding or gaming, but this bargain of a notebook is well built, light at just 2.38KG and offers two hours battery life.

SPECIFICATIONS: 1.4GHz Celeron M 360; 256MB PC2700 RAM; 40GB HDD; Combo drive; Intel 915GM; 14in 1280 x 768 LCD; 10/100 Ethernet; 802.11b/g WLAN; 3 x USB 2; 0-Sub; XP Home; 1yr RTB warranty; 230 x 355 x 39mm (WHD); 1.6kg.

COMPACT DIGITAL CAMERA

Canon Digital IXUS 55



PRICE: \$479

DELIVERY: \$15

SUPPLIER: www.gamedude.com.auINTERNET: www.canon.com.au

ISSUE: December 2005, page 64

COMMENTS: This sports a quality 3x optical zoom and a 5MP CCD. Plus, it has a desirable chassis that slips easily into a pocket, and incredibly quick operation.

SPECIFICATIONS: 5MP; 2592 X 1944 resolution; 3x optical zoom; 2.8in LCD; 1/500 to 15 secs shutter; 50-400 ISO; +/-2EV; 640 x 480 movies; 50 slot (16MB supplied); Li-Ion battery; 84 x 22 x 56mm (WHD); 160g.

HIGH-END DIGITAL CAMERA

Canon EOS 350D



PRICE: \$1295

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.auINTERNET: www.canon.com.au

ISSUE: June 2005, page 70

COMMENTS: With the same stunning image quality as the 300D, but this time with a slightly higher resolution, faster operation and even more compact body, this is the number one choice for semi-pro. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 8MP CMOS; 3456 x 2304; 18-55mm Canon EF-S lens; 18V LCD; 1/4000 to 30 secs shutter; 100-1600 ISO; +/-2EV; CF & CF-II CARDS; Lithium-Ion battery; 127 x 64 x 95mm (WHD); 540g.

20+ INCH LCD

Philips 200W6



PRICE: \$689

DELIVERY: Free

SUPPLIER: www.scorptec.com.auINTERNET: www.digitalcityonline.com.au

ISSUE: January 2006, page 75

COMMENTS: The price of 20in LCDs is plummeting and this one is a decent performer too. Add to the mix a widescreen format with a 1680 x 1050 resolution and the 200W6 becomes incredibly desirable. No more 1280 x 1024 LCD limitations! Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 20in LCD; 16ms response time; 300cd/m² brightness; 600:1 contrast ratio; native resolution 1680 x 1050; 0-Sub and DVI-I inputs; TCO 03; 478 x 235 x 376-429mm (WHD); 7.8KG.

'A great combination of quality and low price!'

HDV CAMERA

Sony HDR-HC1



PRICE: \$2479

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.auINTERNET: www.sony.com.au

ISSUE: November 2005, page 50

COMMENTS: Sony breaks new ground, introducing high-definition. With awesome quality, you'll never be able to go back to standard PAL resolutions again. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 1080/50i HDV (1440 x 1080 at 1937; 0V recording; 2.97-MP CMOS; 10x optical; electronic image stabiliser; 2.7-inch LCD; 71 x 188 x 94mm (WHD); 680g.

The A-LIST

PORTABLE PROJECTOR

Dell 3400MP



PRICE: \$2698

DELIVERY: Free

SUPPLIER: Dell 1800 812 393

INTERNET: www.dell.com.au

ISSUE: November 2005, page 53

COMMENTS: Top of the crop, thanks to a low asking price and equally low running costs; a weight of just 1.1kg, complete with petite dimensions; and solid all-round image quality.

SPECIFICATIONS: DLP; 1024 x 768 resolution; 1500 ANSI; 15-10M throw distance; 12x optical; 210x1 contrast; Mi-DA interface; 2yr warranty; 204 x 154 x 74MM (WHD); 1.1kg; Running costs: 10c per hour.

HIGH-END PDA

HP iPAQ hx4700



PRICE: \$695

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au

INTERNET: www.hp.com.au

COMMENTS: It may be big compared to other PDAs, but the hx4700 provides near-notebook flexibility thanks to the amazing 4in 480 x 640 screen, great software bundle - including the excellent Pocket Informant 5 - and the ability to add up to 5GB of storage. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 624MHz Intel CPU; 64MB RAM; 128MB ROM; 480 x 640 LCD; SD/MMC/SDIO; Type II CompactFlash; B02i-B; Bluetooth; IR; Outlook 2002; Pocket PC 2003 SE; 77 x 15 x 131mm (WHD); 1.87g.



'It provides near-notebook flexibility, thanks to the screen.'

VALUE PDA

palmOne Tungsten E2



PRICE: \$327

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au

INTERNET: www.palm.com.au

ISSUE: September 2005, page 46

COMMENTS: This is the ideal partner for your Bluetooth mobile. And with good battery life, a great screen and compact dimensions, it's also a fine PDA. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 200MHz Intel CPU; 32MB flash; 320 x 320 LCD; SD/MMC/SDIO; Bluetooth; IR; USB; Palm Desktop; Documents To Go 7; Palm OS 5.4; 78x151x14mm (WHD); 133G Li-ion battery; B4 x 22 x 56MM (WHD); 160g.

17-INCH LCD

ViewSonic VP730b



PRICE: \$440

DELIVERY: \$20

SUPPLIER: www.implesx.com.au

INTERNET: www.viewsonic.com.au

ISSUE: January 2006, page 43

COMMENTS: The VP730b's stand is one of the best we've seen, flexing generously in every direction. Performance is good with movies, games and applications. It all comes at a negligible premium too.

SPECIFICATIONS: 17-in; 270CD/m² brightness; 500:1 contrast ratio; native resolution 1280 x 1024; DVD-D, 2 x D-Sub Inputs; TCO '99. Dimensions 372 x 279 x 477mm (WHD); 5.7kg.

19-INCH LCD

ViewSonic VX924



PRICE: \$598

DELIVERY: \$15

SUPPLIER: www.megapc.com.au

INTERNET: www.viewsonic.com.au

ISSUE: September 2005, page 64

COMMENTS: Its 4ms response time may grab headlines, but the high-quality panel shows detail and clarity. It's certainly worth the extra money over a 17in TFT.

SPECIFICATIONS: 4ms; 270CD/m² brightness; 500:1 contrast ratio; 1280 x 1024 native resolution; D-SUB and DVI-D; TCO 99; 431 X 201 X 472MM (WHD); 6.7kg.

MOBILE COMMUNICATIONS

HP iPAQ hw6515 Mobile Messenger UPDATED



PRICE: \$704

DELIVERY: \$15

SUPPLIER: www.pc.net.au

INTERNET: www.hp.com.au

ISSUE: November 2005, page 49

COMMENTS: This GPS-equipped BlackBerry killer also sports a 1.3-megapixel camera and quad-band phone. Buy before March and get TomTom Navigator (worth \$399) free!

SPECIFICATIONS: 3.2MHz Intel CPU; 64MB RAM; 64MB ROM; 320 x 320 LCD; SD & Mini SD slot; 1.3MP camera; IR; Bluetooth; GSM/GPRS/EDGE quad-band; GPS; Pocket PC 2003 SE; 71 x 21 x 18mm (WHD); 165g.

MP3 PLAYER

4GB iPod Nano



PRICE: \$344

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au

INTERNET: www.apple.com.au

ISSUE: November 2005, page 46

COMMENTS: 4GB of solid state memory for a bargain price in an impressive skin. Battery life is poor at 14 hours and it doesn't support WMA, but these are the only downsides to this player. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: 4GB Flash Memory; USB 2 interface; fixed Lithium-Ion battery; Supports for MP3, AAC and WAV formats; 40 x 7 x 89mm (WHD); 42g.

MIMO WIRELESS ROUTER

Belkin Wireless Pre-N



PRICE: \$205

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au

INTERNET: www.belkin.com/au

ISSUE: October 2005, page 96

COMMENTS: The Pre-N fended off the competition in our tests with the highest speeds over long range, and it's also well suited to VoIP. The user-friendly installation routine is a welcome addition. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: MIMO B02i-TG; 4 x 10/100 ports; B02i-DS; MAC cloning; 64/128-bit WEP; WPA; MAC filtering; DMZ; SPI firewall; IP filtering.

PREMIUM INKJET

Epson Stylus Photo R800

PRICE: \$542

DELIVERY: \$22

SUPPLIER: www.implex.com.auINTERNET: www.epson.com.au

ISSUE: September 2004, page 44

COMMENTS: Epson's Hi-Gloss ink is the star of the show, producing supreme-quality photos that show no sign of fading even after months of exposure. The R800 is quick at printing photos too. It's comparatively pricey, but worth it.

SPECIFICATIONS: 5760 x 1440dpi 7-colour inkjet; USB 2; A4 photo in 2 mins, 35 secs; 6 x 4-in photo in 1 min, 37 secs; Max tested speed in draft, 11.6ppm.



'This is a printer for the enthusiastic amateur or pro photographer.'

COLOUR OFFICE LASER

Kyocera FS-C5020N

PRICE: \$1880

DELIVERY: \$22

SUPPLIER: www.implex.com.auINTERNET: www.kyocera.com.au

ISSUE: April 2005, page 63

COMMENTS: This update to the C5016N, which convincingly won our recent colour laser's group test. Running costs are among the lowest around, and great image quality and expansion options make this an attractive buy.

SPECIFICATIONS: 600 x 600dpi colour laser; 16ppm claimed speed; 400MHz CPU; 128MB RAM; 500-sheet input, 250-sheet output trays; 10/100 Ethernet; USB 2; Parallel; PCL6, PCL5C and PostScript3 emulation.

WORKHORSE OFFICE LASER

HP Laserjet 4350dtn

PRICE: \$3159

DELIVERY: \$22

SUPPLIER: www.implex.com.auINTERNET: www.hp.com.au

ISSUE: April 2003, page 52

COMMENTS: The 4350dtn reached speeds of 68ppm in our tests - phenomenal for a machine of this size. We were impressed with its print quality in all areas too, and its build quality and networking features are high.

SPECIFICATIONS: 1200 x 1200dpi mono laser; 45ppm claimed speed; 460MHz CPU; 96MB RAM; 500-sheet input, 100-sheet multi-purpose tray; duplex; 10/100 Ethernet; USB 2; Parallel; PCL6, PCL5C and PostScript3 emulation.

VALUE INKJET

Canon Pixma iP3000

PRICE: \$189

DELIVERY: Free

SUPPLIER: www.digitallyonline.com.auINTERNET: www.canon.com.au

COMMENTS: Canon uses all its design skill with the iP3000, as the shape and recessed ports mean you can use it flush against a wall. Print quality is good rather than spectacular, but features such as duplex and CD printing lift the Pixma above its budget brethren. Contact digitallyonline.com.au.

SPECIFICATIONS: 4800 x 1200dpi 4-colour thermal inkjet; A4 photo in 6 mins; max tested speed in draft, 10.9ppm; 2400 x 4800ppi scanner; 33.6k fax; automatic document feeder; 2-line LCO; USB 2; PictBridge.

MULTIFUNCTION PRINTER

Canon Pixma MP780

PRICE: \$435

DELIVERY: \$22

SUPPLIER: www.implex.com.auINTERNET: www.canon.com.au

ISSUE: May 2005, page 90

COMMENTS: Professional users will appreciate the MP780's automatic document feeder and well-featured fax. Add a great printer and a great scanner, and you have a winning combination.

SPECIFICATIONS: 4800 x 1200dpi 4-colour thermal inkjet; A4 photo in 6 mins; max tested speed in draft, 10.9ppm; 2400 x 4800ppi scanner; 33.6k fax; automatic document feeder; 2-line LCO; USB 2; PictBridge.

ADSL WIRELESS ROUTER

Draytek Vigor 2600VG

PRICE: \$279

DELIVERY: Free

SUPPLIER: www.dsl-warehouse.com.auINTERNET: www.draytek.com.au

ISSUE: October 2005, page 95

COMMENTS: The Vigor 2600VG distinguishes itself with an outstanding feature set including full VPN functionality and, more importantly, extensive VoIP features. Slash your phone bills and save cash.

SPECIFICATIONS: 802.11g; ADSL modem; 4 x 10/100 Ports; 802.11E QoS; 64/128-bit WEP; WPA; MAC access control; VPN support (16 tunnels); 2 x RJ-45 phone ports for VoIP.

FLATBED SCANNER

Epson Perfection 3490 Photo

PRICE: \$195

DELIVERY: \$8 to \$35

SUPPLIER: www.secret.com.au/pca100INTERNET: www.epson.com.au

ISSUE: February 2006

COMMENTS: The image quality would happily grace a scanner costing three times the price, and it's quick: a 150ppi A4 scan took just six seconds, and a 300ppi scan a mere 21 seconds.

SPECIFICATIONS: 3200 X 6400ppi scanner; CCD sensor; 224 X 305mm scan area; USB 2 Interface; transparency adaptor; ABBYY FineReader Sprint 6; 275 X 419 X 86mm (WxDH)

AMD MOTHERBOARD

ASUS A8N-SLI Deluxe

PRICE: \$179

DELIVERY: \$15

SUPPLIER: www.pc.net.auINTERNET: www.asus.com.au

ISSUE: February 2006

COMMENTS: This fully featured nForce4 chipset supports PCI Express graphics cards and SLI - it isn't short of features. It's also the fastest Socket 939 we've seen.

SPECIFICATIONS: Socket 939; NV10IA nForce4 SLI 2x PCI Express 16x; 2 x PCI Express 1x; 3 x PCI slots; 4 x DIMM sockets; max 4GB PC3200; 8-channel audio; 4 x SATA RAID 0, 1, 5, 10; 4 x SATA RAID 0; 4 x Dual Gigabit Ethernet.

The A-LIST

INTEL MOTHERBOARD

Abit AL8



PRICE: \$212

DELIVERY: \$10

SUPPLIER: www.megapc.com.au

INTERNET: www.2abit.com.tw

ISSUE: October 2005, page 51

COMMENTS: The AL8 is a great choice for Pentium D setups - just note it doesn't support the Pentium 4 Extreme Edition or SLI graphics. But the low price, plentiful RAID options and High Definition Audio more than compensate.

SPECIFICATIONS: Socket 775; Intel 945P chipset; ICH7R south bridge; 7.1 audio; 1 x PCI-E (16x); 3 x PCI-E (1x); 2 x PCI; 4 x DOR2; Ultra ATA/100; 6 x SATA 2; 2 x PCI; 4 x USB 2; FireWire; 2 x Digital S/PDIF out; Gigabit Ethernet.

PERFORMANCE GRAPHICS CARD

Albatron 7800GT



PRICE: \$535

DELIVERY: \$23

SUPPLIER: www.secret.com.au/pca100

INTERNET: www.albatron.com.tw

ISSUE: November 2005, page 127

COMMENTS: Despite costing some \$200 less than a 7800 GTX, this 7800 GT card only sacrifices a tiny amount of performance; most importantly, it can still play even the toughest games at 1600 x 1200 resolutions with anti-aliasing switched on.

SPECIFICATIONS: PCI-E; NVIDIA GeForce 7800 GT; 400MHz core; 256MB 500MHz GDDR3 RAM; 256-bit memory interface; 7/20 vertex/pixel pipelines; 2 x DVI-I; video out/in.

INTERNAL DVD WRITER

Lite-On SOHW 1693S



PRICE: \$64

DELIVERY: \$12

SUPPLIER: www.secret.com.au/pca100

INTERNET: www.liteon.com

ISSUE: December 2005, page 91

COMMENTS: There's no excuse for having a slow, under-specified DVD writer now that you can buy one of the fastest drives on the market (including dual-layer writing) for under \$70 makes this a steal.

SPECIFICATIONS: IDE DVD Writer; 2x8 Buffer; 16x DVD+R; 16x DVD-R; 8x DVD+RW; 6x DVD-R DL; 4x DVD-R DL; 48x CD-R; 24x CD-RW; CyberLink PowerDVD; Nero Express Suite.

MID-RANGE GRAPHICS CARD

Albatron 6800 GS



NEW

PRICE: \$359

DELIVERY: \$15

SUPPLIER: www.computeralliance.com.au

INTERNET: www.sapphiertech.com/en

ISSUE: January 2006, page 49

COMMENTS: If you can't justify spending over \$500 on a graphics card but still want to play the latest games at 1280 x 1024, the 6800 GS chipset is a great choice. The only caveat is you'll have to drop extra effects in games like F.E.A.R and Call of Duty 2.

SPECIFICATIONS: PCI Express; NVIDIA GeForce 6800 GS; 420MHz core clock; 256MB 256-bit 500MHz GDDR3 RAM; 5 vertex and 12 pipelines; 1 x DVI-I; 1 x VGA; S-Video.

EXTERNAL HARD DISK

Lacie 250GB USB 2



PRICE: \$262

DELIVERY: Free

SUPPLIER: www.digitalcityonline.com.au

INTERNET: www.lacie.com/au

ISSUE: July 2005, page 88

COMMENTS: It's quiet, compact and with a 250GB capacity it's more than enough. It's also cheaper per GB than many internal drives. Contact navid@digitalcityonline.com.au.

SPECIFICATIONS: USB 2; 250GB; 7200RPM; 8MB buffer; 29DBA sound level (measured); 10.63ms average seek time (measured); 2yr RTB warranty; 112 X 189 X 36mm (WDH); 900g.

INTERNAL HARD DISK

160GB Maxtor DiamondMax 10



PRICE: \$138

DELIVERY: \$13

SUPPLIER: www.minidigital.com.au

INTERNET: www.maxtor.com.au

ISSUE: July 2005, page 90

COMMENTS: Nothing else can match the DiamondMax 10 for its mixture of quietness and value for money; the 160GB model works out at just 86 cents per gigabyte. And now it's lead-free too.

SPECIFICATIONS: Model 6L2000M: SATA; 300GB; 7200RPM; 8/16MB buffer; 28.808A sound level (measured); 10.13ms average seek time (measured); 600,000 hours MTBF; 2yr RTB warranty.

SOUND CARD

Creative X-Fi XtremeMusic



PRICE: \$195

DELIVERY: \$15

SUPPLIER: www.pc.net.au

INTERNET: <http://au.creative.com>

ISSUE: December 2005, page 58

COMMENTS: With onboard audio providing more than enough power for most users the sound card market is declining. But the X-Fi is a welcome update to the Sound Blaster that can deliver perceptibly better audio.

SPECIFICATIONS: Line/mic/coaxial S/PDIF input; 7.1 line output (on three mini-jacks); PCI 24-bit/96kHz input and output; 109dB signal-to-noise ratio; supports EAX Advanced HD 4, ASID 2, Dolby Digital EX and DTS ES.

ANTI-SPYWARE

PC Tools Spyware Doctor 3.2



PRICE: US\$30

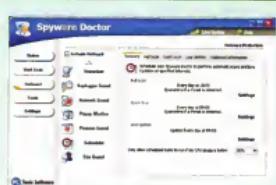
UPGRADE: N/A

SUPPLIER: www.pctools.com

INTERNET: www.pctools.com

ISSUE: December 2005, page 79

COMMENTS: Perhaps not the best-known anti-spyware app, but it proved to be the best in our vigorous tests by some distance. It had the highest detection, removal and blocking rates. With a seamless updating process, blistering scan times and hordes of useful features, Spyware Doctor is our clear favourite. And it's equally suitable for novices as it is experts.



'Equally suitable for the novice and the expert, Spyware Doctor is a clear winner.'

WEB DEVELOPMENT SUITE

Macromedia Studio 8

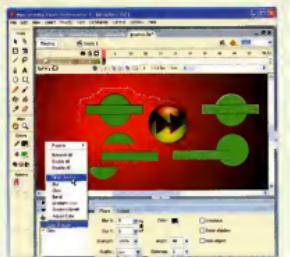
PRICE: \$1344

UPGRADE: \$540

SUPPLIER: www.impex.com.auINTERNET: www.macromedia.com.au

ISSUE: November 2005, page 92

COMMENTS: Although Dreamweaver 8 isn't a huge improvement, it's still the best page-oriented web authoring package available. For those wanting to deliver a richer web experience, Flash Professional 8 sets new standards. And Studio 8 is the best way to buy into both, not to mention Fireworks, Contribute 3 and FlashPaper 2.



'Studio 8 is a watershed release.'

ACCOUNTS SOFTWARE

MYOB Accounting Plus v15

PRICE: \$431

UPGRADE: \$245

SUPPLIER: www.impex.com.auINTERNET: www.myob.com.au

ISSUE: July 2005, page 54

COMMENTS: Not a major upgrade but some fine tuning helps keep MYOB ahead of the game. It's highly customisable and provides everything from invoices, quotes and payment advices to full accounts control and reconciliation, GST to BAS preparation and business banking.

PERSONAL OFFICE SUITE

OpenOffice 2.0

PRICE: Free

UPGRADE: N/A

SUPPLIER: www.openoffice.orgINTERNET: www.openoffice.org

ISSUE: February 2006

COMMENTS: This suite makes it even easier to shift from Microsoft Office, with a reassuringly similar menu structure and excellent file compatibility. With a high quality word processor, spreadsheet, presentation software and database thrown in, you can't argue with its value.



GRAPHICS/DESIGN SUITE

Adobe CS2 Standard Edition

PRICE: \$1370

UPGRADE: \$537

SUPPLIER: www.advancesoftware.com.au/pca/pcaINTERNET: www.macromedia.com.au

ISSUE: February 2004, page 50

COMMENTS: With Photoshop costing over \$900 alone, it makes sense to buy Creative Suite 2, which also includes ImageReady, InDesign and Illustrator. But with powerful photo-editing tools, superb multilayer handling and non-destructive transformations, Photoshop remains the crown jewel.

VIDEO EDITING

Pinnacle Liquid Edition 6

PRICE: \$759

UPGRADE: N/A

SUPPLIER: www.computeralliance.com.auINTERNET: www.pinnacleys.com

ISSUE: March 2005, page 58

COMMENTS: Pinnacle Liquid Edition 6 is a complete editing package, with comprehensive file support including HDV. It's great at real-time editing and is capable of mixing at least three tracks of DV. At nearly half the price of Premiere Pro 1.5, it's a powerful, user-friendly app.



INTERNET SECURITY SUITE

ZoneAlarm Internet Security Suite 6

PRICE: \$90

UPGRADE: N/A

SUPPLIER: www.zonelabs.com.auINTERNET: www.zonelabs.com.au

ISSUE: November 2005, page 69

COMMENTS: A highly effective anti-spyware tool adds the finishing touch to ZoneAlarm's many existing strengths: arguably the best software firewall around, some brilliant privacy features, a strong anti-virus module and impressive spam filtering.

CORPORATE OFFICE SUITE

Microsoft Office 2003 Professional Edition

PRICE: \$685

UPGRADE: \$455

SUPPLIER: www.impex.com.auINTERNET: www.microsoft.com/australia

ISSUE: January 2004, page 58

COMMENTS: Microsoft Office's corporate-friendly features (such as ease of roll-out) and emphasis on XML mean it can't be ignored. But perhaps its biggest strength is that every other business now expects you to be using Microsoft Office.

PHOTO EDITING

Adobe Photoshop Elements 4

PRICE: \$149

UPGRADE: N/A

SUPPLIER: www.secret.com.au/pca100INTERNET: www.adobe.com.au

ISSUE: January 2006, page 52

COMMENTS: Elements 4 makes it ridiculously easy to organise photographs, including the ability to automatically recognise faces. You then have the choice to quickly fix photos or tap into the Photoshop-based power, including layers. Then output the results to slide show, WMV file, DVD or the web.

Reviews Roundup

TOP 10 PCs

	MODEL NAME	PRICE	ISSUE	PAGE	SPECIFICATION	VERDICT	SCORE
1	Scorpene Stinger	\$3999	97	48	2.6GHz Athlon 64 X2 4400+, 1GB PC3200 RAM; 500GB HDD; GeForce 7800GTX; 19in LCD.	Virtually no detail has been ignored in this very well-rounded, powerful system.	*****
2	TI Power Dual AMO 4000	\$3999	97	47	2.4GHz Athlon 64 X2 4800+, 1GB PC3200 SDRAM; 400GB HDD; GeForce 7800GTX; 19in LCD monitor.	A good-value and very powerful system for those seeking ultimate performance.	*****
3	PC Express Phoenix 1550A	\$3800	96	38	2.6GHz Athlon 64 X2 4200+, 1GB 3200DDR RAM; 256MB XpertVision GeForce 7800GTX; 500GB HDD; 19-inch LCD.	A near perfectly balanced performance PC.	*****
4	Altech Zed Cryo	\$6423	95	38	2.8GHz Athlon 64FX-57; 1GB 3200XL RAM; 2x 7800GTX SLI; 32GB HDD; 19-inch LCD.	Obscenely fast, although some features could be better. As could the noise.	*****
5	Dell Dimension 9100	\$2699	95	44	3GHz Pentium D; 1GB PC2-5300 RAM; 6800 graphics; 160GB HDD; 19-inch LCD.	A mid-range dual-core system that offers great value for money.	*****
6	TI Super Dual AMO 2500	\$2499	97	51	2.2GHz Athlon 64 X2 4400+, 1GB PC3200 RAM; 400GB HDD; GeForce 6600GT graphics; 19in LCD.	A very tidy system for the money. Only mediocre 3D speed keeps it from climbing higher.	*****
7	PCMarket SDS-1	\$999	92	42	AMD Athlon 64 2800+; 512MB RAM; 80GB HDD; 17-inch LCD; RADEON 9250.	A very good machine for under a grand, and with some flexibility for future upgrades.	*****
8	PC Market Athlon64 GOCS	\$1499	92	42	1.8GHz Athlon 64 3400+; 1GB PC3200 DDR RAM; 128MB Leadtek GeForce 6600GT; 160GB HDD; 17-inch LCD.	No obvious weak points make this our budget system of choice.	****
9	Pioneer DreamVision PC	\$1999	96	96	2.8GHz Pentium4 551; 1GB PC3200 RAM; RADEON X600; 200GB HDD.	It's a portable PC shaped like a barrel, but could do with a punchier feature set.	****
10	Aztec G-Phase	\$3999	96	41	2.2GHz Athlon 64 3700+; 1GB PC3200 RAM; 2x X16RAZ 7800GTX SLI; 160GB HDD; 19-inch CRT.	Some great gaming components, but it's overpriced for the spec.	****

FOCUS ON: Small form factor

Small form factor PCs may seem like the next step in case design, but beware. One of the biggest issues you'll face is heat dissipation and, with the new trend of dual-card graphics, they may overheat, particularly with dual graphics. Only choose a SFF case for a specialist task, which will allow you to optimise the components. You can leave out unnecessary heat generating components, and you'll save room for what you need.

TOP 5 MCEs

	ISSUE	PAGE
1	Enspire AVR-200	\$1699
	1.8GHz Athlon 64 3000+; Radeon Xpress 200; 512MB PC3200 RAM; 200GB	
	✓ RECOMMENDED: The Enspire looks good and sports everything it needs while keeping the price down.	
2	Altech Maestro Pro 2	\$2999
	Intel Pentium D 820; Intel 945P chipset; 1GB PC2-5200 RAM; NVIDIA GeForce 6600	
	✓ LABS WINNER: Top-notch high performance, great design and impressive build quality too.	
3	Fujitsu Deskpower TX	\$1699
	3GHz Pentium 4 2600; Intel 945P chipset and graphics; 512MB PC4300 RAM; 600GB	
	✓ RECOMMENDED: Despite some quirks this is a desirable system that brings both computer illuminati and illiterati into the world of Media Center.	
4	Claritha TeraServer CTS1000	\$5499
	2.2GHz AMD Athlon 64 3500+; VIA K8T800P chipset; 1GB PC3200 RAM; GeForce 6600; 1000GB	
	More features than you'd think you need. But even if money was no object we'd still have doubts.	
5	Total Home Theatre PC 301	\$3200
	2.6GHz AMD Athlon 64 3200+; NVIDIA nForce 4 chipset; 512MB PC3200 RAM; NVIDIA GeForce 6600; 200GB HDD	
	It just tipped the scales in our noise test, but this is a very tempting system.	

ARCHIVERS

1	7-Zip	Free	99	62	1.02MB download	Looks aren't everything, and 7-Zip is brimming with features, and costs nothing.	*****
2	WinRK	US\$30	99	62	2.6MB download	A good GUI and solid encryption round off an exceptional package.	*****
3	WinRAR 3.5	US\$29	99	62	1.1MB download	One of the fastest compression utilities around and still holds its own when it comes to archive size.	*****
4	WinZip 10 Professional	US\$50	99	62	5.32MB download	What it lacks in compression ratio and value, it makes up for in job automation.	*****
5	SecureZIP	US\$100	99	62	8.35MB download	Industrial grade encryption is overkill for the home, but it's ideal for the business network market.	****

TOP 5
SMB PCs

		ISSUE	PAGE
1	Dell OptiPlex GX620 USFF	\$1436	95 56
	3GHz Pentium 4 533; 512MB PC2-4200 RAM; Intel 945G Express chipset; 80GB HDD.		
	✓ RECOMMENDED: The smallest GX620 is the pick of Dell's bunch. Quiet, stylish and perfectly tuned for business.	★★★★★	
2	HP dc7600 Slim Desktop	\$1270	96 79
	2.8GHz Pentium 4 532; 512MB PC2-4200 RAM; Intel 945G Express chipset; 80GB HDD.		
	✓ RECOMMENDED: With a low price, the Ultra Slim is excellent value for money.	★★★★★	
3	HP dc7600 Convertible MT	\$1270	95 56
	2.8GHz Pentium 4 532; 512MB PC2-4200 RAM; Intel 945G Express chipset; 80GB HDD.		
	The Minitower demonstrates the versatility of HP's range.	★★★★★	
4	Dell OptiPlex GX620 SF	\$1499	95 56
	3GHz Pentium 4 533; 512MB PC2-4300 RAM; Intel 945G Express; 80GB HDD.		
	✓ RECOMMENDED: Quiet, stylish and perfectly tuned for business.	★★★★★	
5	Dell OptiPlex GX620 MT	\$1499	95 58
	2.8GHz Pentium 4; 1GB DDR2-533; NVIDIA GeForce 6600; 15.4-inch screen; 60GB HDD.		
	✓ RECOMMENDED: Like the SF, but with a larger, and more functional, case.	★★★★★	

FOCUS ON:
Intel Core

Intel's next generation notebook CPU, formerly codenamed Yonah, has just undergone a name change to Intel Core. The Centrino platform remains the same, but where Pentium M was used as the CPU under the bonnet, the Intel Core chips will now be used. There are two flavours of Core, Duo and Solo, and they are named according to the number of cores on the chip.

TOP 10 NOTEBOOKS

	MODEL NAME	PRICE	ISSUE	PAGE	SPECIFICATION	VERDICT	SCORE
1	ITC Millennia 7350	\$4999	94	43	3.6GHz Pentium 4; 2GB DDR2-533 RAM; GeForce Go 6800 Ultra; 17-inch display; 160GB HDD.	The mother of all notebooks for those after pure, unadulterated grunt and features.	*****
2	Dell Latitude D410	\$3270	96	44	2.8GHz Pentium M 760; 1GB PC2-4200 RAM; 60GB HDD; Intel GMA 900 graphics; 12.1-inch display.	Top-notch performance, great design and impressive build quality too.	*****
3	Sony VAIO VGN-TX17GP	\$3799	97	52	1.2GHz ULV Pentium M 753; 1GB PC3200 RAM; 12.1-inch widescreen; Intel GMA950 graphics; 60GB HDD.	A notebook showcasing all Sony's usual design skill, squeezing a dual-layer DVD writer into a sleek 1.4KG.	*****
4	Lenovo ThinkPad X41	\$3649	95	40	1.5GHz Pentium M 758 LY; 512MB PC2-4200 RAM; 60GB HDD; Intel GMA 900 graphics; 12.1-inch display.	Great build quality, a remarkably low weight and impressive battery life, but expensive.	*****
5	Toshiba Portege R200	\$3220	95	43	1.2GHz Pentium M 753 ULV; 512MB PC2-4200 RAM; 60GB HDD; Intel 915GM graphics; 12.1-inch display.	Outstandingly engineered. Less ergonomic but lighter alternative to the X41.	*****
6	Dell Inspiron D610	\$3032	94	38	Intel Pentium M 750 1.9 GHz; 1GB DDR2; 95GM graphics; 40GB HDD.	It's expensive but well worth the money. For business use, you won't go wrong with it.	*****
7	Fujitsu Lifebook P7120	\$2649	100	54	1.2GHz Pentium M 753 ULV; Intel 915GM graphics; 512MB RAM; 10.6-inch widescreen; 60GB HDD.	What it lacks in power and, to some extent, practicality, it more than makes up for in design and pure gorgeousness.	*****
8	HP Compaq nw8240	\$4639	98	38	2.1GHz Pentium M 770; 1GB RAM; 15.4-inch widescreen; ATI Mobility FireGL Y5000 graphics; 80GB HDD	Impress your clients, do real work on the move or at your desk, and maybe even watch the occasional widescreen movie. The nw8240 is a professional tool that has it all.	*****
9	Acer Aspire 9504WSMi	\$3249	100	56	2GHz Pentium M 760; 1GB RAM; 17-inch widescreen; ATI Mobility X700 graphics; 1000GB HDD.	A solidly built laptop with plenty of entertainment features and a bright, clear display. Power and quality that won't break the bank.	*****
10	Compaq Presario V2340AP	\$1713	98	38	1.4GHz Celeron M 360; 256MB PC2700 RAM; 14-inch widescreen; Intel 915GM graphics; 40GB HDD.	What it lacks in power is made up for in design and sheer value. If you're a light-use user, it's an excellent choice.	****

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Reviews Roundup

TOP 10 COMPACT DIGITAL CAMERAS

MODEL NAME	PRICE	ISSUE	PAGE	SPECIFICATION	VERDICT	SCORE
1 Canon Digital IXUS 55	\$499	97	64	5MP CCD; USB 2; 640 x 480 at 30fps video mode.	An uninspiring and slightly chunkier update to a phenomenal camera, it's the best compact you can buy.	*****
2 Canon Digital IXUS 50	\$473	95	63	5MP CCD; 2592 x 1944 max resolution; 640 x 480 30fps movies.	Great image quality, both for stills and video, all wrapped up in a desirable, well-built chassis.	*****
3 Sony Cyber-Shot DSC-W5	\$599	91	47	5MP CCP; 2.5-inch LCD; 32MB internal memory; 640 x 480 video mode.	A minor update, but superbly engineered and with great image quality.	*****
4 Samsung Digimax V700	\$899	91	72	7.1MP CCD; 3072 x 2304 max resolution; 38-114 focal length; USB.	A well-priced digital compact, with all the bells and whistles.	*****
5 Canon Digital IXUS 700	\$849	91	72	7.1MP CCD; 3072 x 2304 max res; 37-111 focal length; USB.	Small, sexy and fast. You'd be hard pressed to find something as small that performs as well.	*****
6 HP Photosmart R717	\$499	95	63	6.2-megapixel CCD; 2864 x 2160 max resolution; 320 x 240 30fps movies.	An attractive price makes the R717 a good choice for undemanding photography.	****
7 Olympus C-70 Zoom	\$899	91	74	7.1MP CCD; 3264 x 2448; 38-190 focal length; USB.	A good performer all-round. This offers great value for money.	****
8 Casio Exilim Pro EX-P700	\$999	91	73	7.2MP CCD; 3072 x 2304 max res; 33-132 focal length; USB.	A camera with good results. It's not the cheapest around, but it produces good quality images.	****
9 Konica Minolta DiMAGE A200	\$1399	91	73	8MP CCD; 3264 x 2448; 24-200 focal length; USB	Well featured but an average performer. There's better value had in compacts, or up the scale to SLR.	****
10 Sony Cyber-Shot DSC-V3	\$1499	94	43	7.1MP CCD; 3072 x 2304; 34-136 focal length; USB.	A relatively high price tag lowers what is otherwise a good all-rounder.	****

FOCUS ON: Optical zoom

Digital cameras often come with two types of zoom - optical and digital. Optical zoom adjusts the focal length of the lens to zoom in and out, while digital zoom simply enlarges the image through interpolating pixels and 'guessing' what the zoomed image should look like. While camera manufacturers don't market digital zoom as heavily as they used to, you'll still find wild zoom claims like '400x', despite few people ever actually making use of it.

TOP 5 17-in LCDs

MODEL	PRICE	ISSUE	PAGE
1 Viewsonic VP730B	\$459	98	43
✓ RECOMMENDED: An excellent monitor that is hard to beat at the price.			
2 BenQ FP71V	\$451	95	47
✓ RECOMMENDED: Not the best technical performer, but great value for bargain buyers.			
3 Polyview V372	\$389	94	69
Dirt cheap but a good display. Questionable build quality stops it getting an award.			
4 Samsung SyncMaster 730BF	\$420	99	44
Samsung's practical, no-frills monitor isn't quite A-List material, but the 3-year zero-defect warranty is great.			
5 ASUS PM71T	\$499	94	65
Average all rounder, but excellent value for money.			

PHOTO EDITING

1	Adobe Photoshop Elements 4	\$145	98	52	Windows XP	Improved image management, enhancement and sharing make a great product even better.	*****
2	Adobe Photoshop CS2	\$1129; \$339 upgrade	92	62	Windows 2000 (SP3) onwards	Photoshop users will benefit from many new features and enhancements.	*****
3	Corel Paint Shop Pro X	\$299; \$169 upgrade	98	54	Windows 2000 (SP3)/XP	Improved usability, new photo-centric features and the bundling of Photo Album provide new focus.	*****
4	Macromedia Fireworks 8	\$406	96	61	Windows 2000/XP	A few tweaks to creative power, workflow and integration don't add up to much.	****
5	Ulead PhotoImpact 11	\$90; \$50 upgrade	98	58	Windows 98 SE onwards	A quirky and powerful alternative to Photoshop Elements 4, but it isn't as easy to use.	****

TOP 10 LASER PRINTERS

MODEL NAME	PRICE	ISSUE	PAGE	SPECIFICATION	VERDICT	SCORE
Kyocera Mita FS-C5016N <small>WINNER</small>	\$3848	89	63	600 x 600dpi; 16ppm colour; 16ppm mono; 345 x 470 x 385mm (WDH).	Great quality and incredibly cheap running costs make the Kyocera a deserving winner.	★★★★★
HP Laserjet 4350tn <small>WINNER</small>	\$3176	85	52	1200 x 1200dpi; 68ppm mono; 418 x 533 x 498mm (WDH).	We're impressed with its print quality an features in all areas. And how does 68ppm grab you?	★★★★★
Xerox Phaser 8400DP <small>WINNER</small>	\$4394	89	63	600 x 600dpi; 24ppm colour; 24ppm mono; 422 x 533 x 368mm (WDH).	With low running costs and great quality, it's just slightly too expensive.	★★★★★
Epson AcuLaser C1900	\$2310	89	63	600 x 600dpi; 4ppm colour; 16ppm mono; 469 x 521 x 526mm (WDH).	Exceptional colour quality for the price, but slow and expensive to run.	★★★★
Epson AcuLaser C3000N	\$1299	89	63	600 x 600dpi; 24ppm colour; 24ppm mono; 439 x 590 x 445mm (WDH).	The AcuLaser is a great mid-range choice - it's quick and reasonably economical.	★★★★
Lexmark C760	\$3437	89	63	1200 x 1200dpi; 24ppm colour; 24ppm mono; 604 x 470 x 528mm (WDH).	A fast, good-quality printer, but note it suffers from high running costs and no integrated networking.	★★★★
Brother HL-2700CN	\$1549	89	63	600 x 600dpi; 8ppm colour; 31ppm mono; 460 x 420 x 385mm (WDH).	Good colour quality and incredible mono speed, but it's expensive to run.	★★★★
Oki C3100	\$898	89	63	600 x 1200dpi; 12ppm colour; 19ppm mono; 400 x 528 x 342mm (WDH).	Oki is ideal for those who don't need network capabilities and won't be printing in high volumes.	★★★★
HP Color LaserJet 2550n	\$1549	89	63	600 x 600dpi; 4ppm colour; 19ppm mono; 482 x 452 x 376mm (WDH).	The 2550n lacks speed and isn't the cheapest to run by a long way.	★★★
Samsung CLP-550n	\$799	89	63	600 x 600dpi; 5ppm colour; 20ppm mono; 510 x 467 x 405mm (WDH).	Compact and capable of decent quality, but it lacks features and is slow.	★★★

TOP 5 MFDs

		ISSUE	PAGE
1	Canon Pixma MP780	\$599	90 89
1	4800 x 1200 printer; 9600 x 9600 scanner; 17ppm colour; 25ppm mono; 486 x 472 x 344mm (WDH).		
✓ LABS WINNER: Able to perform all functions equally well. This is a true all-rounder.			
★★★★★			
2	Samsung SCX-4100	\$399	90 89
2	600 x 600 printer; 600 x 600 scanner; 14ppm mono; 422 x 400 x 239mm (WDH).		
✓ RECOMMENDED: An excellent B&W laser unit, with great scanning quality.			
★★★★★			
3	Epson Stylus Photo RX630	\$599	90 89
3	600 x 1440 printer; 2400 x 4800 scanner; 16ppm colour; 17ppm mono; 456 x 256 x 439mm (WDH).		
Designed to cater for the photo enthusiast, but lacks versatility.			
★★★★★			
4	Lexmark X7170	\$499	90 89
4	4800 x 1200 printer; 19,200 x 19,200 scanner; 15/22ppm colour/mono; 490 x 427 x 305mm (WDH).		
A good unit, overshadowed by its award winning brother, the Lexmark P6250.			
★★★★★			
5	HP PhotoSmart 2710	\$699	90 89
5	4800 x 1200 printer; 19,200 x 19,200 scanner; 20ppm colour; 30ppm mono. No digital input and an average display just can't compete.		
★★★★★			

FOCUS ON:
Ergonomics

Ergonomics means more than adjusting your set and raising your monitor. It now plays a role in everything from keyboards to cameras. Generally, all ergonomic designs try to emulate the natural physical movements and posture of the body for the type of activity being performed. Anything outside the body's natural movement creates strain, which at best will prevent you from using it for long periods, and may cause temporary or permanent injury.

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Wireless connectivity and some features may require you to get an additional hardware, service or external hardware. Availability of public wireless LAN access points is limited. System performance, battery life, wireless performance and functionality will vary depending on your specific hardware and software configurations.

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Reviews Roundup

TOP 10 GRAPHICS CARDS

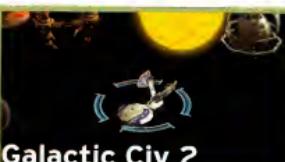
1	Albatron 7800GT	\$609	96	127	Spec	Verdict	Score
2	Albatron 6800 GS	\$359	98	49	NVIDIA 6800GT; 425MHz core; 500MHz memory; 256MB GDDR3; Shader Model 3	If the final price rivals Sapphire's GT, this Shader Model 3 card, could be the mid-range card of choice.	*****
3	Sparkle SP-PX70GVH 7800 GT	\$619	96	129	NVIDIA 7800GT; 400MHz core; 500MHz memory; 256MB GDDR3.	It's the same card at the same price as the Albatron. But the software bundle just pips it.	*****
4	Asus Extreme N7800GTX 512MB	\$849	99	48	NVIDIA 7800GTX 512MB; 550MHz core; 850MHz memory; 512MB GDDR3; Shader Model 3	Awesome performance, but too expensive if you won't push it to its limits.	****
5	MSI RX1800 XT-VE2 512E	\$799	99	47	ATI X800 XT; 625MHz core; 750MHz memory; 512MB GDDR3; Shader Model 3	Stunning performance, but overkill for most and very, very expensive.	****
6	XFX GeForce 7800 GTX	\$729	96	129	NVIDIA 7800GTX; 450MHz core; 625MHz memory; 256MB GDDR3.	The best software bundle, top performance and low price make the XFX's card the best 7800 GTX.	*****
7	Sapphire Radeon X800 GTO Ultimate	\$289	98	49	ATI X800 GTO; 400MHz core; 480MHz memory; 256MB GDDR3; Shader Model 2	Offers a staggering amount of rendering power for your money. It's also passively cooled but only supports Shader Model 2	*****
8	PowerColor X1800XL	\$609	98	46	ATI X1800 XL; 500MHz core; 500MHz memory; 256MB GDDR3; Shader Model 3	PowerColor's X1800 XL seriously rivals the best 7800GT cards.	*****
9	GeCube Radeon X1600 XT	\$285	99	47	ATI X1600 XT; 590MHz core; 690MHz memory; 256MB GDDR3; Shader Model 3	Some respectable scores, but for now the best bet at this price is still the X800 GTO.	****
10	MSI RX1300 Pro-TD256E	\$175	99	47	ATI X1300 Pro; 800MHz core; 800MHz memory; 256MB GDDR3; Shader Model 3	Quiet and unobtrusive, but only good for gaming at the lowest of resolutions.	****

HOT PICKS: 4X STRATEGY GAMES



Civilization 4

The original and still the best 4X series ever made. Take your civilization from caves to space in one sitting. When you're done, play online or extend it with mods.



Galactic Civ 2

The first one was a stellar game from an independent game developer. Two promises stronger AI and ship customisation. Expect a release in coming months.

FOCUS ON: LightScribe

Previous methods of disc labelling, like using specialised hardware or scrawling with a permanent marker, only served to create an extra step in the process. LightScribe technology attempts to take out the middle man and allow you to burn labels and designs straight onto the disc itself. To use it, you'll need a revamp of your current burning setup, including drive, discs, software and drivers. The specially coated discs react with the laser to produce a basic grey-scale label.

TOP 5: BURNERS

		ISSUE	PAGE
1	Lite-On SOHW1693S	\$64	97 89
2	Plextor PX-740A	\$249	97 89
3	LG GSA-4165B	\$106	97 89
4	Asus DRW-1608B	\$64	97 89
5	HP dvd640i	\$97	97 89



FreeOrion

An open source remake of the original Master of Orion, which dominated space strategy for years. It's still in early stages, but check it out at www.freeorion.org.

Inside: Motherboards

Motherboards can be scary looking things to the untrained eye.

We explain what's going on.

ULTRA ATA PORTS

Ultra ATA (or Parallel ATA) ports preceded SATA ports. They are wider, requiring more awkward cabling. Although some hard disks still use the interface, they are mostly used for connecting optical drives now.

INTEGRATED COMPONENTS

Features like USB 2, FireWire and audio codecs are all chips and chipsets that are wired onto the motherboard. You access them via the I/O Backplane or the component headers.

CPU SOCKET

Intel's 'new' socket 775 saw a change in ethos from a processor manufacturer. Rather than having pins on the processor and slots on the motherboard's socket, Intel scrapped the processor pins and passed the problem of bent pins on to the motherboard manufacturers. Now Intel's desktop processors clamp onto a motherboard CPU socket that has pins attached to it - 775 of them.

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TOP 5 HDDS: EXTERNAL

ISSUE PAGE

1	LaCie 250GB USB 2 \$396	92	94
	USB 2; 250GB; 7200 RPM		
	✓ RECOMMENDED: Quiet, compact and with a decent capacity, it offers outstanding value for money.		★★★★★
2	LaCie 2 Big Disk 500GB \$799	92	96
	USB 2/FireWire 800; 500GB; 7200 RPM		
	Huge capacity and fast over FireWire 800. A great choice if you have this interface.		★★★★★
3	Maxtor OneTouch II \$449	92	96
	USB 2/FireWire; 200GB; 7200 RPM		
	Good performance, good value and quiet too.		★★★★★
4	Seagate Portable 100GB \$499	92	99
	USB 2; 100GB; 5400 RPM		
	Expensive for the capacity, but highly portable and virtually silent.		★★★★
5	Seagate 200GB External \$349	92	99
	USB 2/FireWire; 200GB; 7200 RPM		
	Relatively expensive per GB and noisy.		★★★

FOCUS ON: Solid-state HDDs

Conventional hard drives have a speed limitation, particularly when dealing with fragments of data scattered around the physical platter on the disc - it simply takes time for the read/write heads to jump around to each location. RAM drives, or solid-state storage, get around this problem by using the blindingly fast transfer speeds of RAM, which can access its stored memory instantly. It's not all roses - RAM capacities are staggeringly small and, unless they have a charge, will lose their hold on the data. But for the sheer wow factor of booting up Windows in a heart beat, you can't go wrong.





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 * All silver cases have an aluminum chassis

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Model Name	VR2009SNS	VS2000NS
Colour	Silver	Black
Net Weight	5.5 kg	
Overall Dimensions	720 x 430 x 460 mm (HxWxD)	
Cooling System	• Front (intake): 62 x 120 mm (120mm, 1200 RPM) • Rear (Exhaust): Dual 60 x 60 x 25 mm (12mm, 2500 RPM, 1200 RPM)	
Front Accessible ports	3 x 5.25" x 2 x 3.5" 3 x 3.5"	
Material	Chassis: 1.0 mm 304C Premium Sheet Aluminum made	
Expansion Slots	7	
Motherboards	ATX, Micro ATX	



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Our Price Original

(A) Any 4	\$28	\$96
(B) Any 8	\$56	\$192
(C) Any 10	\$68	\$240
(D) Any 12	\$80	\$288
(E) Any 16	\$104	\$384

DEAL 2

BCI-21 / BCI-24 Series

(Includes 21 Black, 21 Colour, 21 Black, 24 Colour)

Our Price Original

(A) Any 2 Black	\$11	\$25
(B) Any 5 Black	\$27	\$62
(C) Any 8 Black	\$43	\$100
(D) Any 10 Black	\$54	\$124
(E) Any 2 Colour	\$14	\$55
(F) Any 5 Colour	\$35	\$138
(G) Any 8 Colour	\$54	\$220
(H) Any 10 Colour	\$65	\$276

BC Series

(Printhead Cartridges)

Our Price Original

BC-02	\$29	\$52
BC-03	\$29	\$45
BC-05	\$32	\$63
BC-20	\$29	\$66

BROTHER® compatibles

DEAL 6

LC-02/ LC-04/ LC-21/ LC-47/ LC-800 Series

(Includes Black, Cyan, Magenta, Yellow)

Our Price Original

(A) Any 4	\$36	\$86
(B) Any 8	\$72	\$172
(C) Any 12	\$104	\$258
(D) Any 16	\$136	\$344
(E) Any 20	\$159	\$430

LEXMARK® compatibles

Quality Cartridges

(Cartridges with printhead attached. Includes Black and Colour Cartridges)

Cartridge Model	Our Price	Original
17G0050 (50)	\$35	\$48
17G0060 (60)	\$37	\$57
12A1970 (70)	\$35	\$60
12A1980 (80)	\$37	\$63
10N0016 (16)	\$35	\$46
10N0026 (26)	\$37	\$51

EPSON® compatibles

DEAL 3

NEW Range Included

T0321, T0422-T0424, T0461-

T0474, T0491-496, T0561-564

(Includes Black, Cyan, Magenta, Yellow, Light-Cyan, Light-Magenta)



Our Price Original

(A) Any 4	\$38	\$72
(B) Any 6	\$57	\$108
(C) Any 8	\$74	\$144
(D) Any 12	\$106	\$216
(E) Any 16	\$139	\$288

DEAL 4

T007/ T008/ T009/ T017/ T018/ T026/

T027/ T028/ T029/ T038/ T039

(Includes Black and Colour cartridges)



Our Price Original

(A) 1 Bk + 1 Colour	\$22	\$95
(B) 2 Bk + 1 Colour	\$32	\$145
(C) 2 Bk + 2 Colour	\$44	\$199
(D) 4 Bk + 3 Colour	\$74	\$301
(E) 6 Black	\$60	\$279
(F) 6 Colour	\$69	\$245

DEAL 5

T013/ T014/ T050/ T051/ T052/ T053/

S020089/ S020093/ S020108/

S020110/ S020187/ S020189/

S020191/ S020193

(Includes Black, Colour cartridges)



Our Price Original

(A) 1 Bk + 1 Colour	\$16	\$77
(B) 2 Bk + 1 Colour	\$22	\$110
(C) 2 Bk + 2 Colour	\$32	\$154
(D) 4 Bk + 3 Colour	\$56	\$238
(E) 6 Blacks	\$34	\$188
(F) 6 Colours	\$59	\$232

Ultra-New Cartridges

T0621, T0631-T0634

(Includes Black, Cyan, Magenta, Yellow)



Cartridge Model Our Price Original

T0621 (high vol. Bk)	\$13.00	\$17
T0631 (stand. Bk)	\$10.50	\$13
T0632 (cyan)	\$10.50	\$13
T0633 (magenta)	\$10.50	\$13
T0634 (yellow)	\$10.50	\$13

HP® compatibles

Quality Cartridges

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NEW Release

Cartridge Model Our Price Original

C6615D (15)	\$26	\$53
C6625D (17)	\$34	\$55
C6614D (20)	\$30	\$54
C1823D (23)	\$34	\$63
51625A (25)	\$30	\$65
51626A (26)	\$30	\$60
C8727A (27)	\$26	\$35
C8728A (28)	\$29	\$40
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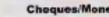
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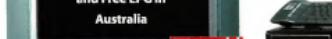


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